S. HRG. 117–368

BUILDING A STRONGER FINANCIAL SYSTEM: OPPORTUNITIES OF A CENTRAL BANK DIGITAL CURRENCY

HEARING

BEFORE THE

SUBCOMMITTEE ON
ECONOMIC POLICY

OF THE

COMMITTEE ON
BANKING, HOUSING, AND URBAN AFFAIRS
UNITED STATES SENATE

ONE HUNDRED SEVENTEENTH CONGRESS

FIRST SESSION

ON

EXAMINING THE OPPORTUNITIES PRESENTED BY A CENTRAL BANK DIGITAL CURRENCY

JUNE 9, 2021

Printed for the use of the Committee on Banking, Housing, and Urban Affairs

Available at: https://www.govinfo.gov/

U.S. GOVERNMENT PUBLISHING OFFICE
48–634 PDF WASHINGTON : 2022

COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS

SHERROD BROWN, Ohio, *Chairman*

JACK REED, Rhode Island
ROBERT MENENDEZ, New Jersey
JON TESTER, Montana
MARK R. WARNER, Virginia
ELIZABETH WARREN, Massachusetts
CHRIS VAN HOLLEN, Maryland
CATHERINE CORTEZ MASTO, Nevada
TINA SMITH, Minnesota
KYRSTEN SINEMA, Arizona
JON OSSOFF, Georgia
RAPHAEL WARNOCK, Georgia

PATRICK J. TOOMEY, Pennsylvania
RICHARD C. SHELBY, Alabama
MIKE CRAPO, Idaho
TIM SCOTT, South Carolina
MIKE ROUNDS, South Dakota
THOM TILLIS, North Carolina
JOHN KENNEDY, Louisiana
BILL HAGERTY, Tennessee
CYNTHIA LUMMIS, Wyoming
JERRY MORAN, Kansas
KEVIN CRAMER, North Dakota
STEVE DAINES, Montana

LAURA SWANSON, *Staff Director*
BRAD GRANTZ, *Republican Staff Director*

CAMERON RICKER, *Chief Clerk*
SHELVIN SIMMONS, *IT Director*
CHARLES J. MOFFAT, *Hearing Clerk*

SUBCOMMITTEE ON ECONOMIC POLICY

ELIZABETH WARREN, Massachusetts, *Chair*
JOHN KENNEDY, Louisiana, *Ranking Republican Member*

JACK REED, Rhode Island
CHRIS VAN HOLLEN, Maryland
TINA SMITH, Minnesota
JON OSSOFF, Georgia

TIM SCOTT, South Carolina
THOM TILLIS, North Carolina
KEVIN CRAMER, North Dakota
STEVE DAINES, Montana

GABRIELLE ELUL, *Subcommittee Staff Director*
NATALIA RIGGIN, *Republican Subcommittee Staff Director*

C O N T E N T S

WEDNESDAY, JUNE 9, 2021

WITNESSES

Additional Material Supplied for the Record

BUILDING A STRONGER FINANCIAL SYSTEM: OPPORTUNITIES OF A CENTRAL BANK DIGITAL CURRENCY

WEDNESDAY, JUNE 9, 2021

U.S. SENATE,
COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS,
SUBCOMMITTEE ON ECONOMIC POLICY,
Washington, DC.

The Subcommittee met at 2:30 p.m., via Webex, Hon. Elizabeth Warren, Chair of the Subcommittee, presiding.

OPENING STATEMENT OF CHAIR ELIZABETH WARREN

Chair WARREN. This hearing will come to order.

This hearing is in the virtual format, so I want to do a few reminders before we begin.

Once you start speaking, there will be a slight delay before you are displayed on the screen. To minimize background noise, please click the mute button until it is your turn to speak or to ask questions. And you should all have one box on your screens that is labeled "Clock", and it will show how much time you have remaining.

For witnesses, you will have 5 minutes for opening statements. You can submit a written statement that is as long as you want.

For all Senators, the 5-minute clock also applies for your questions.

Now, at 30 seconds remaining for your statements and questions, you are going to hear a little bell ring just to remind you that your time has almost expired, and it is going to ring again when your time has expired.

If there is a technology issue, we will just move to the next witness or the next Senator until it gets resolved. And to simplify the speaking order process, Senator Kennedy and I have just agreed to go by seniority for this hearing.

So I am going to start with an opening statement here, and let me start by saying good afternoon and welcome to this session's second hearing of the Economic Policy Subcommittee. Today's hearing focuses on the opportunities presented by a central bank digital currency. This is a bipartisan hearing. In fact, it was Ranking Member Kennedy's suggestion to hold it, and I want to thank him and I want to thank his team for working so closely with us to get it put together.

Now, the core subject of this hearing is not Bitcoin or Dogecoin or any other cryptocurrency. Instead, it is the explosion of cryptocurrencies over the last decade that has created the context

for understanding the potential value and risks of a digital currency.

There are substantial difficulties with our current payment system. Nearly 33 million Americans have been locked out of the traditional banking system. They are forced to use check cashers and payday lenders for basic banking services. And even those with traditional checking and savings accounts find that many of the largest banks have proven to be untrustworthy, gouging customers for overdraft or other fees, or in the case of Wells Fargo, just outright cheating their customers with fake accounts and fake services for which the customers pay dearly.

So what are the alternatives? Digital currencies have been hyped as a solution to these problems. Early advocates claim that cryptocurrencies would open up the financial system and deliver fast, cheap, and secure payments to anyone with an Internet connection. Others pointed out that crypto was a way to avoid the risks of dealing with giant banks that squeezed customers dry.

But crypto's promises have not come to pass. Instead, here is what is happening in the real world with cryptocurrencies. Cryptocurrencies have turned out to be a fourth-rate alternative to real currency.

First, cryptocurrencies are a lousy way to buy and sell things. Unlike the dollar, their value fluctuates wildly, depending on the whims of speculative day traders. In just the last 2 months, the value of Dogecoin increased by more than tenfold and then declined by nearly 60 percent.

Now, that may work for speculators and fly-by-night investors, but not for regular people who are looking for a stable source of value to get paid in and to use for day-to-day spending.

Second, crypto is a lousy investment. Unlike, say, the stock market, the cryptoworld currently has no consumer protection. None. As a result, honest investors and people trying to put aside some savings are at the mercy of fraudsters. Pump-and-dump schemes are outlawed in the case of ordinary stock, but they have become routine in cryptotrading. One study found that the level of price manipulation in cryptocurrencies is, and I quote, "unprecedented in modern markets."

And, third, crypto has become a haven for illegal activity. Online theft, drug trafficking, ransom attacks, and other illegal activity have all been made easier with crypto. Experts estimate that last year more than $412 million was paid to criminals in ransom through cryptocurrencies, and unlike other payment systems that make it tougher to move money illegally, a key feature of crypto is its secrecy. So just in the past few weeks, cryptocurrencies made it possible for hackers to collect the ransom to release the Colonial Pipeline hack and to free JBS, the world's largest meat producer, from paralyzing cyberattacks. And every hack that is successfully paid off with a cryptocurrency becomes an advertisement for more hackers to try more cyberattacks.

Finally, there are the environmental costs of crypto. Many cryptocurrencies are created through proof-of-work mining. It involves using computers to solve useless mathematical puzzles in exchange for newly minted cryptocurrency tokens. Such mining has devastating consequences for the climate. Some cryptomining is set

up near coal plants, spewing out filth in return for a chance to harvest a few cryptocoins. Total energy consumption is staggering, driving up demand for energy.

If, for example, Bitcoin, just one of the cryptocurrencies, were a country, it would already be the 33rd largest energy user in the world, using more energy yearly than all of the Netherlands.

And all those promised benefits, the currency that would be available at no cost to millions of unbanked families and that would provide a haven from the tricks and traps of big banks, well, those benefits have not materialized.

Meanwhile, cryptocurrency has created opportunities to scam investors, assist criminals, and worsen the climate crisis. The threats posed by crypto show that Congress and Federal regulators cannot continue to hide out hoping crypto will go away. It will not. It is time to confront these issues head on.

Crypto has significant problems, but our current payment system also has significant problems. Both the Government and banks have dragged their heels for years, resisting innovation and evidently taking the same hide-and-wait approach to facing the worldwide movement into cryptocurrencies. Central bank digital currency, which is often called "CBDC"—because the world needs another acronym. Digital currency from central banks has great promise. Legitimate digital public money could help drive out bogus digital private money. It could help improve financial inclusion efficiency and the safety of our financial system if that digital public money is well designed and efficiently executed, which are two very big ifs.

So I am looking forward to hearing from our witnesses today about how a central bank digital currency would work, why it might be necessary, how it intersects with cryptocurrency, and, most importantly, how it should be set up so that all Americans can enjoy its benefit.

And, with that, I will turn to you, Senator Kennedy. Would you like to do an opener here?

OPENING STATEMENT OF SENATOR JOHN KENNEDY

Senator KENNEDY. I would, Madam Chair. Can you hear me OK?

Chair WARREN. I can hear you just fine.

Senator KENNEDY. I thought Chair Warren did a very good job of outlining the disadvantages of cryptocurrency—that is not really what I want to focus on—and the challenge in terms of how our regulatory platforms deal with those disadvantages. I was reading an article the other day that made the point—some may agree, some may disagree, but the quickest way to get rid of ransomware and what it is doing to our various countries is to get rid of cryptocurrency. I am not sure I am ready to go that far, but I thought it was a salient point.

I jotted down a few notes which I am going to refer to here. I do not normally do this, but I want to be as concise as possible so we can get to our witnesses.

This is an important topic. I see this as an opportunity today to explore the advantages and disadvantages of a central bank digital currency. As Chair Warren referred to, we call that "CBDC." I agree with her about the need for another acronym. Will it work

for the United States? Will it work for the world? What value, if any, will it contribute to U.S. monetary policy and world monetary policy?

Technology continues to emerge in our financial system and specifically in our payment system. I think the demand for digital payments and the influx of what I will call "non-legal tender" like cryptocurrencies, to me it is clearly going to continue to explode. These forms of payments I think we all know have operated outside our traditional payments infrastructure. As the Chair pointed out, they have proved to be volatile. They have proved to be controversial. They have proved to be speculative. They have proved to be subject to manipulation in some cases. We have seen that with respect to Bitcoin. And I do not mean just to pick on Bitcoin. There are other forms of cryptocurrency.

Cryptocurrencies and Stablecoins, though, I think we have to—if we are honest with ourselves, we have to admit that they are on the rise, and we need to examine the risks that a decentralized currency would pose to the Federal Reserve's control of monetary policy. Maybe that is self-evident, but I think it needs to be stated.

The United States is leading the world in innovation and technology. The United States dollar—and we are all very proud of this—has remained the world's primary reserve currency. We want to keep it that way. Many Governments around the world, as you know, are exploring a CBDC for use in today's digital world. I think the United States should also do that, explore it, as we are doing.

But we have to understand, it seems to me—and I hope we will learn more about this today—that whether public demand exists, who would benefit most from a CBDC has to be asked, and who would benefit least and who would not benefit at all and who would be perked. And we also have to take an honest look at whether the juice is worth the squeeze when it comes to cost, when it comes to security risks.

Now, as we know, China has created its own digital currency. We have all read about it, the digital yuan. It uses that—not the people of China, who I have great regard for, but the Government of China, which I have little regard for because it is run by a bunch of pirates. The Government of China has used the digital yuan to monitor everyday transactions of its citizens. It has used it to broaden its massive surveillance system. I think there is a lesson there.

Additionally, China is using its CBDC to maintain greater control over its economy and to expand China's monetary influence in the world. And I think we need to be mindful of that, and we have got to analyze the implications of a Chinese CBDC on global competitiveness, on international commerce, and the U.S. dollar's position as the global world currency.

I will try to cut through some of this. I also need to mention this. I am very concerned—I do not want to overstate it, but it is a question that has to be addressed—about proposals that would use the CBDC to fundamentally change our current banking system. I think we need to explore that. I am not convinced that CBDC should be used to replace the paper dollar or to replace bank depos-

its. If the U.S. chooses to hold a CBDC, it needs to do so, it seems to me, in a way that complements our current financial system.

There was a superb article in, I think, *The Economist* last week or the week before last that talked about a CBDC not just as a payment system but its implications for the credit markets. Do we want the Federal Government to get into the business of credit? And if it does, what does that mean for our commercial banking system?

So I guess my point is we need to strike the right balance. We need to ask the hard questions. We need to listen and learn. And I want to thank our witnesses for being here today and for sharing some of their time and educating us.

Thank you, Madam Chair.

Chair WARREN. And thank you, Senator Kennedy.

And now, Senator Brown, you are recognized for an opening statement.

OPENING STATEMENT OF CHAIRMAN SHERROD BROWN

Chairman BROWN. Thank you, Chair Warren and Ranking Member Kennedy, and thanks to my friend Ranking Member Toomey for being part of this hearing, too.

Senator Warren and Senator Kennedy both, thanks for making this Subcommittee as active as it has become already. I am glad that our Subcommittee on Economic Policy convened this hearing to explore how a central bank digital currency can be designed to maintain our country's leadership in the global economy, to make our economy work better for workers and their families. That is kind of the whole point.

Other countries around the world are already taking steps to establish central bank digital currencies. I think we agree the United States must not be left behind. We need to lead the way.

As millions of working families in this country know, it is expensive to be poor—check-cashing fees, transfer fees, late fees, overdraft fees. We hear all kinds of promises about how crypto and digital currencies would be more inclusive alternatives to the current banking system, but the approaches offered by cryptocompanies so often are just simply not solutions. They are just another volatile risky asset for Wall Street speculation and put some people's hard-earned money and potentially our entire financial system at risk.

One way we give Americans more control over their money is through my plan for no-fee accounts available to every American at a post office or a small bank or a credit union backed by the Federal Reserve. Americans should not have to pay exorbitant fees just to use the money they have already earned. People could receive money, take out cash, pay their bills online without fees.

A central bank digital currency can work with these no-fee accounts to make sure working families have access to the payment system and full participation in our economy. It is time for our banking system, Madam Chair, as you know, to work as well for everyone as it does for Wall Street.

Thanks for giving me a couple minutes, Madam Chair.

Chair WARREN. Well, thank you very much for joining us, Chair Brown, who is the Chair of our Banking and Housing Committee, and I appreciate your being here today.

Senator Toomey, I appreciate your being here today as well. You are recognized if you would like to make an opening statement.

OPENING STATEMENT OF SENATOR PATRICK J. TOOMEY

Senator TOOMEY. Yes, thank you, Chair Warren, and I, too, want to thank you and Senator Kennedy for having this hearing. This is a fascinating and very important topic.

I would just like to suggest that as we consider the creation of a central bank digital currency in the United States, one of the most fundamental questions we need to ask ourselves is: What problem is the central bank digital currency trying to solve? In other words, do we need one?

It is not yet clear to me that we do. I know there are some who think that a central bank digital currency would be helpful because it would enable the Fed to provide retail banking accounts to Americans. Now, in my view, turning the Fed into a retail bank is not a good idea. Retail banks actually do a great job of serving the needs of consumers because they compete with one another in the private sector.

But it is not just banks. Beyond banks, rapidly evolving technology companies are expanding access to the financial system, providing all types of financial products and services to consumers, including people of very modest means. I do not think we need a State-sponsored bank interfering with this very successful free enterprise system.

Nor do we want a Government entity like the Fed positioned to possibly infringe on our privacy, able to track our personal information and monitoring our banking transactions.

And does anyone think that the Government would provide the high-quality customer service that consumers want from a retail bank? The Fed, after all, has absolutely no experience in that realm.

I know others suggest that the U.S. needs to create a central bank digital currency in order to compete with China. The fact that China may well be creating a digital currency does not mean it is inevitable that the yuan would replace the dollar as the world's reserve currency. In fact, there are a lot of reasons to believe China's digital currency will not be terribly appealing. China, after all, has a State-controlled economy, has a repressive authoritarian Government that has got capital controls on the yuan that make it unattractive as a reserve currency. And, let us face it, China's motivation for launching a digital currency in the first place undoubtedly includes tightening its grip on its economy and enhancing surveillance of its citizens, and it would like to be able to surveil others. China likely wants to track every single transaction done with its digital currency and directly control this currency. With features like this, it is doubtful, in my view, that people will flock to the digital yuan and abandon the U.S. dollar as the world's reserve currency.

While I am not at all certain that we need a central bank digital currency, I think we should consider the development of private digital currencies. After all, it has been the private sector, not the Government, that has been responsible for developing cryptocurrencies, including Stablecoins, which, by the way, can be

perfectly stable with respect to the dollar and have no price volatility at all with respect to the dollar. Private digital currencies have the potential to increase access to financial services for all Americans while increasing individual privacy.

Now, people have raised legitimate, important issues about private digital currencies, including their use in illicit activity and the possibility they could affect monetary policy and our existing financial infrastructure. I think we need to discuss these, we need to understand these issues, and we may well need to address them. But we should not lose sight of the tremendous benefits that the underlying technology that digital currencies offer and that disintermediated payments can offer as well. That is why I think we should encourage the continued development of private digital currencies.

I look forward to today's discussion, and I thank our witnesses for sharing their expertise.

Chair WARREN. Thank you, Senator Toomey, and, again, I appreciate your being here today.

So now I am going to introduce today's witness panel. First we have Dr. Neha Narula, who serves as the director of the Digital Currency Initiative at the Massachusetts Institute of Technology.

Next we will have the Honorable Chris Giancarlo, senior counsel at Willkie Farr & Gallagher and the former Chairman of the U.S. Commodity Futures Trading Commission.

After that, we will have Mr. Lev Menand, an academic fellow, lecturer in law, and postdoctoral research scholar at Columbia Law School.

And, last, we will hear from Dr. Darrell Duffie, the Adams Distinguished Professor of Management and Professor of Finance at Stanford Graduate School of Business.

So I thank all of our witnesses for being here today, and let us start with you, Dr. Narula. You have 5 minutes.

STATEMENT OF NEHA NARULA, DIRECTOR, DIGITAL CURRENCY INITIATIVE, MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Ms. NARULA. Great. Thank you, Chair Warren, Ranking Member Kennedy, and Members of the Subcommittee, for the opportunity to testify today.

My name is Neha Narula, and I am the director of the Digital Currency Initiative at MIT. We focus on cryptocurrency and digital currency design. I would like to note that my views are my own and not the views of MIT or the Federal Reserve Bank of Boston, with whom we are engaged in a multiyear research collaboration, Project Hamilton. We will be releasing a paper and open-source software this summer.

Today I am going to do three things: define CBDC and its benefits; give examples of questions that need to be answered before launching a U.S. CBDC, a digital dollar; and suggest ways to answer those questions.

The high fees, long delays, inequitable access, and low innovation in our traditional payment systems have caused central banks to consider issuing digital forms of their currency to the public. Traditional systems simply have not kept pace with the demand for on-

line commerce. Many central banks are engaging in work on CBDC to improve payment efficiency, facilitate financial inclusion, and maintain financial stability.

A general purpose or retail CBDC is defined as a digital liability of a Nation's central bank that is broadly accessible to the general public. That it is a central bank liability distinguishes it from commercial bank money and credit cards. Its digital nature sets it apart from cash, and it is different from central bank reserves in that users can hold it directly.

The promise of a CBDC goes beyond payment efficiency and financial inclusion. Digital currency offers an opportunity for a ground-up redesign of our payment systems. If built in the right way, a digital dollar might empower users and create a platform for innovation in payments, much as the Internet created a platform for innovation by facilitating the transfer of information.

Now, though promising, the way forward is not entirely clear. There are many open questions regarding how a U.S. CBDC should operate, how users might access it, how consumer privacy would be protected, and if a CBDC is the best way to achieve goals such as increasing financial inclusion.

For example, 36 percent of those in the U.S. who lack bank accounts also do not have smartphones. Many Americans do not have reliable Internet connectivity. Such people could not use a digital currency that requires a mobile app or a constant connection to the Internet. At MIT, we are investigating designs that would enable forms of secure offline transactions.

Financial transactions reveal sensitive data about our lives, and protecting privacy is essential for human dignity and a democratic society. Consumer privacy is a requirement for a U.S. CBDC as well as a potential competitive advantage. Yet much work remains to determine how to guarantee privacy while still providing the information necessary to combat illicit activity.

More research is needed to determine how a CBDC might address these challenges. It would be a mistake to move to using a CBDC without understanding the implications for financial inclusion and privacy. Extensive collaboration between academic researchers and the public and private sectors, as well as research funding, is needed to make progress on these key questions.

The first step is to obtain agreement on goals. In parallel, the Treasury Department and the Federal Reserve should be investing more in research and development, not to build the digital dollar but to fully understand its possibilities and implications as well as spur technology development.

To build consensus across various stakeholders and create a neutral environment where the best ideas can flourish, we should rely on the principles of open-source software development. The Government's typical way of building systems—outsourcing to a third-party vendor—will not, in my opinion, work here. What is possible in terms of policy is inextricably linked to the technical implication. The U.S. cannot outsource monetary policy to a vendor.

As a first step, I recommend expanding the type of work that MIT is currently doing with the Boston Fed and expanding other collaborations between academia and the public sector.

In conclusion, we have a once-in-a-century opportunity to redesign the dollar. Central bank digital currency might have the potential to increase financial inclusion, reduce transaction costs, and become a platform for innovation in payments, if designed and implemented well. I commend this Subcommittee for raising this important issue and encouraging this critical dialog.

Thank you, and I look forward to your questions.

Chair WARREN. Thank you very much, Dr. Narula.

Mr. Giancarlo, you are recognized for 5 minutes.

STATEMENT OF J. CHRISTOPHER GIANCARLO, SENIOR COUNSEL, WILLKIE FARR & GALLAGHER

Mr. GIANCARLO. Thank you, Chair Warren, Ranking Member Kennedy, and Members of the Committee. I am Chris Giancarlo, senior counsel at Willkie Farr & Gallagher.

I am here today on behalf of the Digital Dollar Project, a nonpartisan think tank formed over a year ago to discuss the merits of a tokenized form of a U.S. central bank digital currency that we termed a "digital dollar." I commend this Committee for considering the challenges and opportunities of a digital dollar, including its potential for greater access, inclusion, and betterment of the financial system.

Twelve months ago, we proposed a tokenized bearer instrument issued by the Federal Reserve, distributed through the two-tiered banking system, and operated alongside physical currency and commercial bank money. This digital dollar would mirror many of the properties of physical cash, enjoying the full faith and credit of the U.S. Government, but in a digital form.

Instead of withdrawing paper dollars from an ATM and putting them in a leather wallet, you could withdraw digital dollars into a digital wallet on a smartphone. You could then spend digital dollars directly, peer-to-peer, at the corner grocery or online around the globe.

Many thoughtful commentators, including Members of this Committee, are rightly concerned with the risks of such a digital dollar, including its impact on fractional banking and financial stability, energy consumption, current payment models, economic privacy, and the reserve currency status of the dollar. And I assume you, as a former chief regulator, I share the inclination to look at what could go wrong with new innovation, including digital money.

However, as a thought experiment, I would also like to consider for just a moment what could go right. Some worry that a digital dollar might decrease money held in commercial banks. Well, what if the opposite happens? What if more money moves into the banking sector, especially if previously un- or underbanked communities shift digital dollars into bank accounts because of the ease of doing so? And what if mobile devices and digital wallets provide attractive on-ramps to banking services offering interest on deposits and Government insurance? And what if greater ease in converting commercial bank money into digital dollars would make people less likely to do so in a panic?

Now, I know many of you are rightly concerned with energy consumption. But what if a digital dollar used much, much less energy than Bitcoin and other decentralized proof-of-work digital assets?

What if it also used even less energy than is currently used for physical mining, minting, and distribution of paper dollars and metal coins?

Now, some are concerned that a digital dollar could negatively impact current business models for payments. What if a digital dollar actually lowers payment costs and bank fees for consumers and small businesses? But what if it provides instantaneous settlement, reducing cash-flow stress that plagues small businesses and American consumers with costly overdraft and other fees? And what if the economic benefits of increased activity from digital money results in expanding economic opportunity, small business formation, and productivity?

Now, all of us are rightly concerned with infringing individual privacy from mass surveillance of digital money. But what if a digital dollar was carefully engineered from the outset to incorporate Americans' reasonable expectations of individual privacy consistent with our Fourth Amendment? And what if we strike the right balance between the legitimate needs of law enforcement with constitutional protections of individual privacy? And what if a digital dollar with such American legal and due process limitations provides superior protection of individual privacy compared to many other sovereign and, indeed, nonsovereign commercial digital currencies?

And, last, some argue that the dollar's status as the world's reserve currency is so well entrenched it requires no further innovation. But what if a digital dollar improves financial stability, productivity, and efficiency while enhancing the dollar with new functionality, ease of use, and smart contract programmability? And if we add to these enhancements our recognized competitive advantages of the dollars—that is, the backing of a robust and strong economy and good governance and the rule of law—what if we do all those things while protecting individual privacy in faith to our finest national ideals? Would we not then have done our duty to prepare the U.S. dollar to serve our fellow citizens in the coming digital future of money?

In closing, I thank this Committee for considering this topic with appropriate prudence, caution, and thoughtfulness, and in doing so, I hope we not forget to consider what could go right. Only real-world testing will show whether the juice is worth the squeeze, in Senator Kennedy's words.

Thank you.

Chair WARREN. Thank you, Mr. Giancarlo. I appreciate it.

And now, Mr. Menand, you are recognized for 5 minutes.

STATEMENT OF LEV MENAND, ACADEMIC FELLOW AND LECTURER IN LAW, COLUMBIA LAW SCHOOL

Mr. MENAND. Thank you. Chair Warren, Ranking Member Kennedy, Members of the Committee, thank you for the opportunity to testify this afternoon. I am a lecturer in law and academic fellow at Columbia Law School, and in June of 2018, along with Morgan Ricks and John Crawford, I proposed that Congress authorize the Federal Reserve to offer a retail central bank digital currency through a program we called "FedAccounts."

FedAccounts would be available to any U.S. resident or business in digital wallets operated by community banks and the post office. These wallets would charge no fees and have no minimum balances. They would come with debit cards, direct deposit, and bill pay. Their balances would be nondefaultable no matter how large—just like physical cash. They could be exchanged instantly, 24 hours a day, 7 days a week. They would have customer service, privacy safeguards, and fraud protection. If you lost your password, there would be someone you could call. And they would earn interest at the same rate that the Fed pays to banks.

To understand how this system would work, it helps to situate it within our existing money and payment system.

The Government currently creates two types of dollars for the general public: physical dollars and deposit dollars. It creates the first type directly through the Mint and the Fed. It outsources the second type to publicly chartered, privately owned banks.

The second type is more important. We use it to pay the rent, receive our salaries, and save up for a rainy day. These are digital dollars already, and there are over 17 trillion of them circulating, more than 10 times the amount of cash in circulation domestically.

This system is stable—with people treating their deposit balances as equivalent to cash—only because the Government stands behind deposit balances. The Government is the franchisor; it charters banks and backs them. The banks are the franchisees. They interact with the depositors and create the deposits.

The Government also facilitates transfers. When depositors want to pay a customer of another bank, the Fed assists through a program called "FedWire" and another program called "FedACH." If depositors want cash instead of deposits, banks can go to the Fed and get cash at a program called the "discount window." If a bank makes too many bad loans and fails, a Government corporation, the FDIC, steps in to ensure that the bank's deposits can still be exchanged for cash.

But there are a variety of problems with this system, with the digital dollars we already have. It leaves a lot of people out. Over 6 percent of U.S. households do not have access to deposit money at all. It is costly. Banks charge high fees for transferring and holding deposits. And it is slow. Checks drawn on deposit accounts take up to 2 days to clear.

There is also an urgent second-order problem: dangerous deposit substitutes that are not issued by banks. One group of these deposit substitutes has been around for decades and crashed the economy in 2008. These are eurodollars, repos, and money funds. Another group is new. These include Stablecoins and cryptocurrencies like Bitcoin and Ethereum. In good times, these alternative monies can be exchanged faster and more efficiently than bank digital dollars. In the long run, they undermine financial stability, threaten severe recessions, weaken the U.S. internationally, and enable ransomware attacks, money laundering, and tax evasion.

On its own, a CBDC like FedAccount cannot solve all these problems, but it can help. It can bring millions of people into the mainstream financial system. It can speed up payments. It can reduce high fees. It can bolster financial stability by crowding out dan-

gerous deposit substitutes. It can reduce regulatory complexity. It can improve monetary policy transmission. And it can generate revenue for the Government.

For all these reasons, Congress should authorize the Fed to update our money and payment infrastructure for the 21st century. I look forward to answering your questions.

Chair WARREN. Thank you very much. I appreciate it, Mr. Menand.

And now we come to our final witness, Dr. Duffie. You are recognized for 5 minutes.

STATEMENT OF DARRELL DUFFIE, ADAMS DISTINGUISHED PROFESSOR OF MANAGEMENT AND PROFESSOR OF FINANCE, STANFORD UNIVERSITY GRADUATE SCHOOL OF BUSINESS

Mr. DUFFIE. Thank you so much, Chair Warren, Ranking Member Kennedy, and Members of the Committee. Today I would like to explain why I believe you should authorize the Fed to go ahead and develop a central bank digital currency. The decision to deploy this digital dollar can be delayed until a resulting design can be evaluated for the costs and benefits that we have all been discussing today.

This development process will require significant resources and time, perhaps even more than 5 years. Designing an effective central bank digital currency that safeguards privacy while controlling illegal payments will be challenging, as Dr. Narula has explained and as I detail in my written testimony.

While developing the digital dollar, relevant U.S. Government agencies should address shortcomings of the existing U.S. bank payment rails which are generally slow and expensive to use. Regulation that promotes a competitive payments market and the development of a viable CBDC may spur firms that provide the current bank-railed payment system to compete more aggressively in terms of both pricing and technology innovation. And as noted last month by Federal Reserve Governor Lael Brainard, the United States should also position itself with a seat at the table of international discussions regarding standards for the design and appropriate uses of CBDCs.

The U.S. should also prepare a muscular strategy for deflecting undesirable and invasive types of cryptocurrencies as they gain traction in U.S. payments. As you said, Chair Warren, a digital dollar can play a role here by providing an attractive and officially supported alternative.

U.S. banks, though, are capable of providing an effective low-cost payment system, but they have not done so. Current regulations, network effects that limit entry, and profit incentives have not promoted an open, innovative, and competitive market, as I explain in my written testimony.

Calls for alternatives such as fintech payment firms, private stablecoins, and CBDCs have been incited by the low efficiency and high cost of the current bank-railed payment system. The Fed has had to step in with the development of its own real-time payment system, FedNow. FedNow will improve the speed of payments and

offers other efficiencies, but brings no assurance of significantly improved competition for payment services.

A further impetus for the digital dollar is financial inclusion, as my colleagues on the panel have explained. Also, as Dr. Narula explained, this is not a simple matter.

Looking at the international side, China's new digital currency will not add much of a threat to the global dominance of the U.S. dollar, but will likely open commercial opportunities for China in some emerging market economies. This will increase China's influence in these countries, which U.S. foreign policy experts may wish to consider very carefully, supporting Senator Kennedy's remarks. It advantages the U.S. to have its own digital currency technology to offer to countries that wish to lower the costs or advance the development time for introducing their own CBDCs. The United States should also support the development of international agreements that would set standards of care for protecting foreign monetary systems from disruption by another country's CBDC.

In conclusion, the United States should now begin a significant program for the development of a digital dollar. The design should prioritize the efficiency of payments, privacy, financial inclusion, and the ability to monitor payments for compliance. Even a well-resourced development program can be expected to take a number of years to achieve a successful design. The final decision to deploy the digital dollar can be delayed until more is learned.

In parallel with the development of a digital dollar, increased efforts should be made to improve the competitiveness and efficiency of the existing bank-railed payment system. Regulations can be changed to further encourage innovation and competition. The Fed, for example, has recently considered offering accounts to "novel" payment firms under appropriate conditions.

The United States should also take a leadership position in intergovernmental discussions of CBDCs, particularly with respect to their cross-border uses.

Thank you very much for your time.

Chair WARREN. Thank you very much, Dr. Duffie. I appreciate your being here today.

So let us start our questions. I recognize myself to get started here for 5 minutes.

As our witnesses have described, digital currencies offer a lot of potential advantages over cash in your wallet or even the electronic balance on your debit card. You do not have to worry about carrying cash around and losing it or having it stolen. If you want to send money to somebody else, digital currency can be easier and faster.

But in order for those advantages to be realized, the digital version of cash needs to be secure, stable, and accepted everywhere. Your local grocery store is only going to accept digital currency if it knows that the digital version of the $100 that you use to pay for your groceries is actually worth $100. Your babysitter is only going to keep showing up if she knows that the digital $20 you sent her is really worth $20.

So let us talk about using cryptocurrency like Bitcoin to pay for groceries or to pay for a babysitter.

Dr. Narula, is the value of cryptocurrency like Bitcoin generally stable and reliable?

Ms. NARULA. Thanks for the question, Senator Warren. No, it is not. Unfortunately, we just witnessed the value of the entire cryptocurrency ecosystem dropping by about 40 percent over the course of the last 2 months.

Chair WARREN. And how much money was that? Do you know, in dollars, what we think the value of that drop was?

Ms. NARULA. I believe it was close to $1 trillion.

Chair WARREN. About $1 trillion that this thing dropped. But think about what it means for an individual seller. It means the grocery store could take in $100 in Bitcoin to pay for groceries, but by the end of the day, the Bitcoin could be worth only $60, in which case the store loses out.

So these wild swings in value mean that Bitcoin is a terrible currency. In fact, that is why, except for criminals, most people are holding Bitcoin as a speculative investment, a way to make money, rather than as a substitute for money as a way to buy this week's groceries or to pay their babysitter.

Now, the cryptoindustry knows about this problem, so they came up with so-called Stablecoins, and I think we have heard a couple of references to that already today. This is a kind of cryptocurrency that claims to be pegged to the value of a fixed asset like the dollar.

Professor Menand, are these so-called Stablecoins as safe, reliable, and stable as, say, a digital dollar that is issued by the Federal Reserve?

Mr. MENAND. No, Senator, certainly not. They are much riskier. They are dangerous to both their users and, as they grow, to the broader financial system. So whereas Bitcoin is something we really have not seen before, Stablecoins are—they are the devil we know just wearing new clothes. They are tech'd up versions of money market mutual funds in certain respects. They are a type of deposit substitute, and deposit substitutes are very unstable because the people who issue them do not have bank charters, they do not have deposit insurance, they do not have access to the Fed's discount window. And if people lose confidence in Stablecoins, there is a good chance they will dump them en masse in sort of a classic run dynamic. And the people who are slow to get out could be left with significant losses.

Chair WARREN. OK. As you rightly point out, this is not the first time that we have had private sector alternatives to the dollar. In fact, I am going to go back further than you did.

In the 19th century, wildcat notes were issued by banks without any underlying assets, and eventually the banks that issued these notes failed, and public confidence in the banking system was undermined.

The Federal Government stepped in, taxed these notes out of existence, and developed a national currency instead. And that is why we have had the stability of a national currency.

So, in theory, a digital currency issued and backed by a central bank could provide the advantages of cryptocurrency without those risks. The Federal Reserve, a trusted institution, could provide a

digital version of cash to the public that is secure, stable, and accepted everywhere.

So let me ask you, Professor Menand, what role could a central bank digital currency play in reducing these kinds of risks to financial stability?

Mr. MENAND. So a well-designed CBDC could serve as a public alternative to these cryptocurrencies and potentially crowd out their usage. In contrast to private digital currencies, CBDCs would be sovereign, nondefaultable money. They would be cheaper to use, and they would not be subject to bank-run dynamics.

Chair WARREN. Right. So that is very helpful. Thank you.

You know, there are reasons why cryptocurrencies are popping up like weeds. Our current banking system offers bad service or no service to millions of people and businesses, and swindlers have figured out how to skim profits off investors by buying and selling in a marketplace that has no cop on the beat. The risks of replaying the experience of the 19th century are real. These private actors issue their own dollar substitutes that they convince everyone are just as safe as the dollar itself, until, of course, a crisis hits, their dollar substitutes fail, they threaten the entire financial system, and drag down the whole economy.

So I think what this hearing is about is exploring how a central bank digital currency could serve the American people, but it is clear we need to improve our banking and payment systems, but the testimony and facts discussed here make it clear also that we need to address the threats that cryptocurrencies pose.

So let me stop there and, Ranking Member Kennedy, would you like to ask some questions?

Senator KENNEDY. I would, Madam Chair. Can you hear me?

Chair WARREN. I can hear you just fine.

Senator KENNEDY. I want to separate out for the moment cryptocurrencies. I think the failings and the advantages of a cryptocurrency, we could spend four or five hearings on that. And I know our regulatory authorities are trying now to understand how we should deal with it. But I want to put that aside and talk about a digital dollar or a digital currency, which I define as one initiated by the central bank.

And I get the part that the current payment system through private banks can be slow. It can be expensive. I think in one of our last hearings Chair Warren pointed out the amount of money made by one of our larger banks in the United States in overdraft fees. It was in the billions. I did not know that.

So I get that it can be expensive, and I can see conceptually how a digital currency—let me use the term "digital dollar"—could be faster and it could be cheaper.

What are the other advantages, though? And an inverse way of asking that question, aside from gaining more information about its people, why is China doing it? I want to hear from all of you. Let me start with Chairman Giancarlo, who was formerly Chair of the CFTC.

Mr. GIANCARLO. Thank you, Senator Kennedy. You know, when I look around the globe, I see that the BIS says that over 80, close to 90 percent of reporting central banks are now looking at a cen-

tral bank digital currency, and I think three-fifths of them actually have existing experiments underway. Why is that?

Well, I look and I see maybe six imperatives that are driving central banks here but also around the world to take a close look at this. The first one is just as you said. It is about capturing data. I think that is what drove China first with two of its commercial enterprises, Alipay and WeChat Pay, being so successful at capturing its citizens' data. But I also think that drove a number of Western observers, too, with the launch of the potential for a digital currency by a social media platform, and suddenly I think policymakers were concerned about who was going to have the personal data of its citizens.

But there have also been initiatives for infrastructure modernization, and certainly Singapore and our neighbor to the north, Canada, have got some very advanced experiments looking at infrastructure modernization.

And then there are issues of financial inclusion. You know, our neighbor to the south, the Bahamas, has something called the "Sand Dollar" because they have citizens on out-islands that have mobile service, but do not have banking access. And so they are looking at it from a point of view of financial inclusion. And I think we ourselves in the United States are recognizing that that is a possibility, but so is precision distribution of funds as a matter of monetary policy. Certainly during the COVID crisis, when we tried to get checks into hands of our fellow citizens, it did not work out so well for those citizens that did not have bank accounts or were stuck at home or otherwise could not work with a paper check.

And then there comes the issue of geopolitical influence, which I think is certainly a driver for China, with combining a central currency with its Belt and Road Initiative.

But, last, and this perhaps for me is perhaps the most important reason, and that is, who is going to set the standards? If the future of money is digital—and certainly for the past 10 years, society, outside the official sector, has been experimenting with digital money around the world. If the future is digital, then who is going to set the standards? And China, by the way, has been very advanced in looking to set the standards, and that is one of the reasons why I think the United States needs to be more out front of experimenting with that so that we can be a standard setter and a leader in standard setting. Thank you.

Senator KENNEDY. In any additional time in a second round that the Chair provides to us, I am going to ask all of you to answer this. Why don't you get started for me, Dr. Duffie? If you could tell me, other than speed and cost, why else would we want to do a digital dollar in your opinion, if at all?

Mr. DUFFIE. In addition to the advantages that Honorable Giancarlo just mentioned, I will mention one that came up earlier today, which is the fact that if a type of cryptocurrency that you do not want is starting to get heavily used in your payment system, you are having difficulty monitoring the legality of transactions, money laundering, for example, or consumers may have difficulty with the volatility of the currency that we just discussed, those can nevertheless become popular because cryptocurrencies have certain advantages for smart contracting, for token-based applications in

the new digital economy, the Internet of Things, and making payments that do not require waiting for the banks to open, things like that.

So what you want a central bank digital currency to do is to provide those services and displace the undesirable cryptocurrencies before they get traction in your economy. Now, that is not to say that CBDCs win the day in terms of all costs and benefits. But on that point, I think many countries are currently exploring them for that specific reason to head off the invasion of an undesired cryptocurrency. That is what the Bank of Canada, for example, says that it is doing.

Senator KENNEDY. All right. I am out of time. I will come back to Dr. Narula and Mr. Menand and defer back to our Chair here.

Chair WARREN. OK. Thank you, Senator Kennedy.

Senator Reed.

Senator REED. Thank you very much, Madam Chairman.

Mr. Menand, following on this discussion of central banks and the use of these new digital currencies, is it inevitable that the United States will go to a digital currency in order to avoid having the dollar displaced as the currency of record of the world, at least at this moment?

Mr. MENAND. Senator, I do not think anything is inevitable. Unfortunately, going to a digital currency is going to take a lot of work. But I think that there is a high likelihood that over time more and more people will think that a digital currency issued by the central bank is something that the U.S. should be involved in, and so it is important to start that work now.

Senator REED. Do you feel that China in particular has a long-term strategy to develop a digital renminbi, I guess it would be, and deploy that as it does so many other instruments of power, with a deliberate rationale of displacing the U.S. currency?

Mr. MENAND. Yes, I do, Senator. I think this is a source of serious concern. The launch of China's digital yuan last year poses a significant risk to the United States. The main problem is with the sanctions tool. One of the ways the U.S. advances its interests around the world is through the sanctions tool, and one of the ways the sanctions tool works is through the international payment system, and that system revolves around financial institutions. And because those institutions are all connected and they all pretty much do business in dollars, even those based abroad like the Chinese commercial banks have to comply with U.S. sanctions or risk being disconnected from the system.

The Chinese CBDC is going to ultimately offer parties intent on evading U.S. sanctions a way to conduct business without interacting with financial institutions and, therefore, without touching the dollar payment system. So, for example, a company in Thailand might be able to sell materials to North Korea or a company in Iran by paying in what the Chinese are calling "eCNY," potentially without the transaction hitting any Thai banks or other financial institutions. That is a serious risk to the United States.

Senator REED. Just a final question. Right now these cryptocurrencies are not supported by and promoted by and part of the national central banks of any nation, except the Chinese, as you point out, are trying to do that. Even if every major country

went into a position of issuing a digital currency, would the private digital currencies still exist? And would they be disruptive to monetary policy, i.e., when we try to raise interest rates in the United States, they could take the contrary action?

Mr. MENAND. Yes, unfortunately I think they would still exist. So while we can expect a central bank digital currency to crowd out some of these cryptocurrencies that we are seeing sprout up, we need other policy responses as well in order to address the harms though cryptocurrencies are posing. A central bank digital currency will be far from sufficient.

Senator REED. So you could envision perhaps an international agreement which made these private cryptocurrencies illegal and legitimate only the centrally backed or central bank-backed currency, something like that?

Mr. MENAND. I think there is definitely need for international coordination, and there is a range of different tools that the Government—that global Governments together have at their disposal. A ban of some sort is certainly one of the options; the U.S. Government has used those types of tools in the past. During the Great Depression, for example, there was a ban on holding monetary gold in private possession. So that is sort of the nuclear option, but there are a variety of other tools that Government can look at using as well to try to deal with these currencies, including the sanctions tool itself and taxing tools which, as Senator Warren pointed out, is something that the Congress employed in the 19th century to create order in the monetary system and avoid chaotic panic situations.

Senator REED. Thank you very much.

Thank you, Madam Chairman.

Chair WARREN. Thank you, Senator Reed.

Senator Hagerty.

Senator HAGERTY. Senator Warren, Senator Kennedy, thank you for holding this hearing.

You know, innovation is what will keep America's financial and capital markets the envy of the world. But the pace of change of financial technology and especially with digital assets makes our job challenging. The Federal Reserve should continue to explore a digital dollar. Nearly every other country is doing that. And when I asked Chairman Powell about a digital dollar in February, I appreciated his answer that we have a responsibility to get it right. I could not agree more.

So the Fed must explore a digital dollar promptly and carefully, and the Fed should engage with the private sector. There are currently a number of products that are available in the private market that highlight some of the possibilities, and we should not take steps that could threaten to disintermediate, destabilize, or drain significant deposits from the private sector lenders that underpin the strongest and most exceptional economy in the world.

We also understand the true problem that we are looking to solve with the digital dollar. What are the questions we are trying to solve? Is a Fed-run digital dollar necessary to defend the U.S. dollar's supremacy as the world's reserve currency and to maintain stability of the global financial system? Would China's digital currency suffer from the same drawbacks as its hard currency? And

are there better ways to address potential risks from China's efforts?

How would a Fed-run digital dollar impact cross-border payments? Could we better help those who are unbanked and underbanked by removing costly regulations or by continuing to encourage banks to expand their coverage rather than providing a publicly run banking option at the Fed?

We also need to be practical about a digital dollar. We need to understand what are the costs to taxpayers to set this up and how long will it take, especially with everything else that the Fed is working on, including monetary policy, bank supervision, and FedNow real-time payments.

We need to understand what are the cybersecurity risks, and we need to understand the privacy concerns for our citizens. None of us know exactly how financial innovation will evolve, but the last thing we want to do is constrain innovation. These discussions, providing market parity and removing unnecessary regulatory obstacles, all help to move the ball forward.

My first question is coming to you, Chairman Giancarlo. You discussed what China is developing and the prudential implications for that. In your mind, what are the biggest risks to the United States? Is it the loss of our ability to deploy sanctions? Is it the economic coercion? There are a number of reasons now why people are reluctant to hold China's currency. Would those reasons still apply to a digital renminbi?

Mr. GIANCARLO. Thank you, Senator Hagerty. You know, in my testimony I talked about the strength of the dollar as the reserve currency being underpinned by many strong pillars, and one is the fact that many of the world's most important ag and energy commodities, such as wheat and soybeans and crude oil, are priced in U.S. dollars. That means that our farmers do not have to take foreign exchange risk, while overseas customers have to hold dollars. And these dollar prices are set not in cash markets but in deep and liquid American commodity futures markets overseen by the CFTC, where I had the honor to serve.

China recognizes this advantage. As the world's largest consumer of many of these products such as soybeans and crude oil and iron ore, China would much prefer they were priced in the Chinese currency, and that is one of the reasons why they have recently opened their futures markets to overseas participation in iron ore and crude oil futures.

When I was Chairman, the Louis Dreyfus Corporation conducted the first large shipment of American soybeans to China entirely using distributed ledger technology, and all contractual aspects of that shipment from bills of lading to receipt of shipment were conducted with all parties on one universal ledger.

China is very advanced in distributing ledger technology. They have launched a national blockchain service network to lead innovation. No other country, including the United States, has anything like it.

It is only a matter of time before China will combine its lead in blockchain technology with its new digital currency and its futures markets to facilitate the entire process of logistics, payments, and price hedging for key world commodities in one integrated Chinese-

controlled blockchain. And that is why we must explore a tokenized form, I believe, of the U.S. dollar that enables programmability with smart contracts, embedding the most complex business logic into CBDC tokens, including contracts for hedging, logistics, and distribution of world commodities. Losing our edge to China in the pricing of key commodities is not just a concern to American agriculture; it is a concern to the U.S. economy.

Senator HAGERTY. Well, thank you, Chairman Giancarlo, for your leadership, for all of your work in this area, and I applaud you for your continued interest and support as we move forward.

Mr. GIANCARLO. Thank you so much.

Chair WARREN. Thank you, Senator Hagerty.

Senator Warner.

Senator WARNER. Thank you, Madam Chair, and I appreciate you having this hearing. This is a subject that I am quite interested in as well. I am actually stepping out of an Intel hearing that I am chairing, so I want to ask the panel—and I think I will start with Dr. Narula and just go down the list. We have seen both kind of good news and bad news recently, and I know this is not directly to the notion of a digital currency per se, but we have seen cryptocurrencies used as the preferred payment model for ransomware. On the other hand, we have seen the very good news recently that perhaps there is not as much anonymity as some had promoted in the ability to trace back to that Bitcoin wallet and be able to ferret out some of those dollars that went to bad guys on Colonial Pipeline.

But based on your research and engagement with cryptoissues, as we think through digital currency and other related issues, how big a challenge is the—obviously, the security risks, the misuse of these currencies, have we been able to quantify that risk as we weigh the up-and-down benefits? And, again, Dr. Narula, why don't we start with you? And I would love everybody's comments.

Ms. NARULA. Thank you, Senator Warner. I think cybersecurity and security is the first-order concern with any digital currency that the United States might decide to issue. Whatever system underpins it would be national critical infrastructure, so we definitely have to make sure that we get that right.

When it comes to things like the recent spate of ransomware attacks, I think the real underlying problem here is that we have this valuable data that has not been properly secured. It is true that cryptocurrency seems to be the vector of choice; however, it is also the case that because of its open sort of auditable nature, it is able to be a tool for law enforcement, as you pointed out, to then track those funds and return them.

However, ransomware, fundamentally, I think we have to address that by fixing our systems and securing them. A central bank digital currency, if launched, would probably not look like a cryptocurrency exactly. And it is possible to build in safeguards to make it more trackable and to prevent it being used for ransomware. However, as I said, criminals will probably shift to whatever is easiest, and the real way to fix ransomware is to solve the underlying security problem.

Senator WARNER. Agreed. Mr. Menand? And I want to make sure—I have got 2 minutes left, and I have got three more folks to talk.

Mr. MENAND. Sure. I see cryptocurrencies as posing a serious security threat. I think that they enable a type of ransomware that would be impossible otherwise. Think about it this way: If you wanted to hold up a U.S. company for $5 million and there were no cryptocurrencies, you would have to ask for cash or check. If you ask for cash, you have to physical take delivery, which gives law enforcement the ability to easily track you. If you ask for a check or a wire, you have to identify your bank account information.

So it is just impossible. Crypto offers the ability, if you do it right, to use the mixers and tumblers and to convert between multiple currencies and to use various special cryptocurrencies that are private or different from blockchain, like Zcash, to hide your trail. And that is a major, major risk to U.S. law enforcement and national security going forward.

Senator WARNER. I agree, although I do think we are trying to find some other tools there.

Dr. Duffie and then Mr. Giancarlo.

Mr. DUFFIE. I agree with the reply from Dr. Narula and Mr. Menand. The U.S. central bank digital currency needs to be bulletproof and needs to use very muscular regulatory strategies to tamp down the use of cryptocurrencies that are undesirable like Bitcoin. The less accepted Bitcoin is in the broader economy, the more difficult it is for those that would wish to use it for illegal means can convert it into consumption or dollars. And so every effort should be made. In the end, though, as Mr. Menand said, it is going to exist on the fringe, and it is just a question of how muscularly you can try to reduce its use.

Senator WARNER. Mr. Giancarlo.

Mr. GIANCARLO. Yes, indeed. So I would just add to, I think, the very thoughtful comments my predecessor said. One of the benefits of perhaps a consensus-based mechanism which we can learn from other forms of cryptocurrency is the actual difficulty in hacking those systems when you build it on a broad-based distributed ledger system. Now, those are architectural issues, and our colleagues at the Bank of Boston and MIT have been working on some of that core architecture. We are looking forward to their report. But I think that there are advantages that need to be explored in distributed ledger technology to make the system more resilient than perhaps the account-based system we have today, which has been hacked numerous times, even at the Federal Government level.

Senator WARNER. Thank you, Madam Chair. I look forward to working with you on this issue, and Senator Kennedy and others.

Chair WARREN. Very much. Thank you, Senator Warner.

Senator Lummis.

Senator LUMMIS. Thanks very much, Madam Chair and Ranking Member Kennedy, for holding this hearing on the future of the U.S. dollar.

You know, if we build a central bank digital currency in the right way, we can strengthen the global role of the U.S. dollar and secure a strong financial future for next generations here in America. So we have been working in my office on some cornerstone prin-

ciples that we think should be used to judge a CBDC proposal, and among those is privacy. So my first question is for Mr. Giancarlo. It is nice to see you again.

One of the key motivations behind China's digital yuan is surveillance and control of their financial system. So it is clear that we cannot follow China down this road. Any U.S. CBDC should have greater privacy, even the same or greater than physical cash today.

So do you agree that we must provide at least the same level of privacy? And how can strong privacy protections enhance the dollar's value on the global stage?

Mr. GIANCARLO. Thank you, Senator. By the way, my compliments on the launch of your Innovation Initiative, which I think is really terrific.

Senator LUMMIS. Thanks.

Mr. GIANCARLO. I think privacy comes down to one of the key issues behind design of a central bank digital currency. There is no question that China views their development of a digital currency as a tool of State surveillance. That seems very clear. And it would be very much in keeping with the nature of their Government.

We in the United States have a very different approach to economic privacy. We have a Fourth Amendment. And although the jurisprudence of that needs to be extended beyond where it is today to extend to a digital currency, if we get the issue of privacy right—and that is a big issue, but if we get it right in a way that is consistent with our values, a digital dollar, believe it or not, could be the killer app of digital currencies worldwide. And why do I say that? Well, we know that the Chinese currency will be used for State surveillance. Europe is working, the EU is working on one, and they are guided by something called their "GDPR," their privacy protection law. But that only protects from commercial exploitation of data, not from Government use of data. We know that there are commercial entities that would like to develop coins that are tied to social media and others that presumably will mine their currency for data. Only a currency actually, I believe, promulgated by the U.S. Government with proper Fourth Amendment protections could provide the type of privacy that we need.

Now, it has got to be balanced against appropriate law enforcement usage, and we have, again, a long tradition of subpoena process. So a lot of work here for policymakers and I think a big task for Congress is to make sure the social values that are enshrined in the dollar today, the rule of law, economic privacy, free enterprise, are enshrined in a digital dollar tomorrow if we go down that road.

But I will end with this. I think if we get this right, a digital dollar could serve for another generation or more because we have enshrined the privacy rights that got us to where we are today into the future.

Senator LUMMIS. Well, we can see that digital currencies are going to be important in the future based just on what El Salvador has just done. Haiti wants to follow suit. Any country that has remittances as a major part of their economy is going to be the first users of digital currency, and it is very apparent why. It is upon

us, so we absolutely need to do this right. So I really look forward to working with you in the future to make sure we do do it right.

Now, Dr. Menand, I want to turn to your comments on financial stability. A 2016 Bank of England study found that CBDCs have the potential to reduce systemic counterparty risk between financial institutions, especially in times of market stress. A CBDC could allow final settlement in central bank money direct between payer and payee across the Fed's balance sheet. So this would reduce or eliminate capital and collateral that is required to be posted for transactions, including in relation to intra-day overdrafts, putting it to more productive use.

So do you agree that central bank digital currency has the potential to reduce systemic risk in settlements?

Mr. MENAND. Yes, I completely agree. We have focused so far in the hearing a lot on the retail side and the benefits for CBDC for ordinary businesses and individuals and households. But there are also very large benefits for the financial system more generally, and the Bank of England report that you referenced is a good example of some of them.

One thing we have done is we have expanded access to Fed master accounts since the last financial crisis, and that is seen as having stability-enhancing effects. And so, yes, I agree with that, Senator.

Senator LUMMIS. Thanks so much for having this hearing, Madam Chair. I yield back.

Chair WARREN. All right. Thank you, Senator Lummis.

Senator Cortez Masto.

Senator CORTEZ MASTO. Madam Chair, thank you. Thank you so much for the opportunity to participate in this important discussion today. I really appreciate all the panelists and the conversation so far.

Let me start here. Dr. Narula and maybe Mr. Menand, 6.3 percent of the population in Nevada is unbanked, so my question for you is: How could a Federal Reserve-run digital currency system make it easier to connect to those unbanked and provide financial relief directly, maybe making sure they can access unemployment insurance, Social Security benefits, et cetera? Dr. Narula, let me start with you.

Ms. NARULA. Thank you, Senator. So I think the key technique here is to remove sources of friction that keep people from being able to access such a digital construction, a U.S. digital dollar. We need to make sure that there are not onerous restrictions, that people who want to transact in small amounts can do so very, very easily. We also need to make sure that there are the right types of interfaces on top of a digital currency. It cannot just be a mobile app because so many of the people you reference might not have smartphones. So we have to think about people who are not necessarily very technically literate.

And so this means that a digital currency, if issued, would need to have a wide variety of ways to access it, and that means providing the right kind of interface and making sure that it is a platform that other businesses and applications can build on top of as well.

Senator CORTEZ MASTO. Thank you.

Mr. Menand, anything to add?

Mr. MENAND. Yeah, I agree with that. I would just add that if you are poor today, a bank account can be dangerous for you. It has a lot of fees; you might not understand when those fees are going to be levied. So you are in a terrible position. You have to choose between two bad choices: either you are outside of the banking system and it is really hard for you to get Government stimulus payments and to buy things online and to do all sorts of things; or you go in, but you have a small amount of money, and you are going to get hit with account maintenance fees that people with more money do not get hit with and overdraft fees that people with more money do not get hit with, and it might end up costing you a lot.

And so one of the benefits of a CBDC, of a no-fee account offered by the Federal Reserve, central bank digital money, is it would be provided to the public without profitability considerations. So, you know, there would be no sign-up costs, no fees. So people who face that choice right now, they would not have to worry about that because the Government would not be trying to make money off of this program. They would be providing critical public infrastructure to people.

Senator CORTEZ MASTO. And let me add to that, because I often hear from merchants as well about the high fees for cashless transactions. Would this address that issue as well for merchants?

Mr. MENAND. Yes, there would be huge benefits for merchants and small businesses to be able to have an account or central bank digital currency in some form. Huge.

Senator CORTEZ MASTO. I appreciate that. Thank you.

Let me jump back to the privacy issue but the security as well and fraud. Really, this is an issue from my background I am always cautious about, and I am really interested in your thoughts. Let me open it up to the panel. We have seen fraud has been a major problem with cryptocurrencies, but how should a Federal Reserve-issued digital currency be designed, be implemented, and regulated to reduce the risk of fraud? I know we have talked around the edges, but is there something specifically we should be thinking about? And let me open it to the panel. Anybody want to take that on?

Mr. GIANCARLO. Senator, at the Digital Dollar Project, we convened a privacy subcommittee of a number of our advisory board members, and they set out four principles that they believe a central bank digital currency should carry. The first, of course, is economic privacy for users of a digital dollar, as I said before, properly balanced against law enforcement needs.

But the second one is that the system must be secure. The ability to use a digital dollar must carry with it security of one's wealth, of one's value, of one's usage.

And then, third, the system must provide greater accessibility than we have, as Professor Menand just mentioned, for populations that are traditionally underbanked.

And then, last, the system must have sufficient transparency so that users of the system can know that transactions done on the system have been completed, that there is settlement certainty,

that there is payment certainty. And those are core values that we think a central bank digital currency must embody?

Senator CORTEZ MASTO. Thank you. Thank you again. I know my time is up. I really appreciate the opportunity to talk with all of you.

Chair WARREN. Thank you, Senator Cortez Masto.

Senator Daines.

Senator DAINES. Thank you, Chairman Warren. I appreciate it. And thanks to the witnesses who are here today.

I want to start off by talking about the threat we are seeing from China in this particular space. China, of course, has launched a digital yuan which they hope will 1 day displace the dollar as the world's dominant reserve currency. And even beyond the digital yuan, it is no secret that China and many other countries are well ahead of us with regard to financial innovation.

For example, India is also among the fastest-growing fintech markets in the world. In fact, India processed nearly 10 billion more real-time payments than China in 2020, $25.5 billion versus $15.7 billion with China. The U.S. processed just $1.2 billion of real-time payments. While I am not yet convinced we need a digital dollar, I strongly support further exploration in this important area. It is for this reason I am heartened by the nonprofit Digital Dollar Project which will launch five pilot programs over the course of the next 12 months. This type of private sector research will provide data policymakers with what they need to inform the debate about the next steps that we ought to take.

Mr. Giancarlo, can you describe what the world look like, looking out 5 years perhaps, if we continue to let China and others like India race ahead of us in this important area?

Mr. GIANCARLO. Thank you, Senator Daines. You know, the reason why we launched this Digital Dollar Project is we really believe that the nature of money is changing. You know, the Internet has been a remarkable thing, and it is not done weaving its magic web on society. It started by changing the nature of information dissemination and changing industries like entertainment and publishing and travel and leisure and so many things. Well, now it has set its sights on money and in many ways financial services itself.

The use of distributed ledge technology with tokenized money may present a future very different than the one we know today. Today we think of a global network of banking institutions that have been very useful to the United States in sanctions power and other areas, but also to clean up money laundering and surveil that banking network. But in the future, we may see very different networks, networks of digital currency. There may be a yuan network. There may be a dollar-based network. And how these networks interact with each other is going to be of critical importance. And the work of China in looking at blockchain technology and hoping to set the standards of interoperability between these networks is going to be of critically importance. And that is why we so strongly advocate that the United States, whether we eventually want a digital dollar or not, is almost a second order of magnitude issue. The first issue is that we lead in the technological development, we lead in the standard setting. China's standards will be using a network for surveillance of its citizens. Is that what we want in the

United States? Or are our values different? And how do we make sure that the values that got us here, the rule of law, of economic privacy, of appropriate law enforcement needs, are encoded in that digital future, those standards for the future?

Senator DAINES. Commissioner Giancarlo, thank you for that.

I am going to ask Mr. Duffie the same question. I am also reminded that India had an order of magnitude more actual transactions real-time last year than China did, so we have got some important players here.

Mr. Duffie, anything to add to that?

Mr. DUFFIE. I completely agree with Chair Giancarlo. This is about technology. At this stage the United States has fallen behind even India and China with respect to digital currency technology. And the competition for commercial services internationally is very important. U.S. banks have been ceding ground to Chinese banks internationally. And if the United States wants to compete, it is going to have to invest in technology in this area, particularly with respect to the new uses of digital ledger technology. If the United States were to even develop the technology for a central bank digital currency in a private–public partnership, its firms could provide those services internationally and compete with Chinese firms that are already positioning to do that, firms like Alibaba. So I totally agree with Chair Giancarlo.

Senator DAINES. Thanks, Mr. Duffie.

I want to shift to the issue of ransomware and cryptocurrencies. These are another part of the problem, and what we need to continue to study is the case of Bitcoin. Seventy-five percent of it is mined in China, although businesses in Montana—keep an eye on what is going on in Montana in towns like Butte and Hardin and others in the United States. They are starting to grow mining operations for Bitcoin and other cryptocurrencies in massive, massive scale.

Importantly, these high-performance computing operations are capable of building much more than just mining cryptocurrency. For example, they can be used for artificial intelligence, machine learning applications to help us win the future race against China and others.

However, I am worried about the increasing use of cryptocurrencies to pay ransomware to malicious actors. In the case of the Colonial Pipeline, it was encouraging to see the DOJ claw back much of the ransom that was paid, but I think we were given a bit of a lucky break on that one for that clawback.

Mr. Giancarlo, what can we do to help law enforcement crack down on the illicit use of cryptocurrency as well as to combat this trend of ransoms being paid following a cyberattack?

Mr. GIANCARLO. So this is a new area, and I will tell you, as the former head of an agency with enforcement capability, wherever you have got money, you are going to have criminality, and a lot of enforcement work is just an evolving process of cops and robbers. The robbers learn a new technique, and then the cops learn a way to react to it. And that has been since the beginning of history, and that will be.

This new technology, though, presents some interesting both challenges and opportunities. So the accounts-based system always

begin with identification of identity, and so, therefore, you have that buried into a transaction, and you can work your way back to it as a law enforcement matter.

This system is pseudonymous, but it does provide the ability to track transactions, this new distributed ledger technology, and that is what we saw in this case. We saw in this case that both Bitcoin was a means for criminality but it was also actually a means for law enforcement. We are going to get better at using this technology, but it is—you know, how do they call it? It is old wine in new bottles. At the end of the day, the bad guys are going to figure out some new techniques, and the cops are going to be right behind them. And if we do our job—I say this as a former regulator—we should not be too far behind in catching up to the bad activity.

Senator DAINES. Thank you, Mr. Giancarlo .

Chair WARREN. Senator Daines, I know that you are over your time, but would you like to ask this of any of the rest of the witnesses? You do not have to, but I just thought it was a really important question.

Senator DAINES. Well, Madam Chairman, thank you for that, because I think it is a really important question. Now that, you know, the world is flat, the cops and robbers and so forth—of course, this is all of a global nature and can be attacked from anywhere literally in the world.

Anybody else want to answer? Thanks for that opportunity, but I just wanted to——

Mr. MENAND. Sure, I will jump in on that. Thank you, Senator. I agree with Chairman Giancarlo. I would just add that it is not clear to me that the Department of Justice and the FBI tracked the Bitcoin on the public ledger and that is how they clawed back the Bitcoin from the ransomware attack the other day, as opposed to doing old-fashioned police work and capturing the physical servers that the criminals in this case were using and then find out what wallet they were storing the cryptocurrencies in. And I think we need to be very concerned about the incentives that cryptocurrencies provide for criminals to do ransomware attacks because we know that with various mixers and tumblers and other cryptocurrencies that you can trade into, like Zcash, that criminals who do it right can really make it extremely difficult, if not impossible, to track them using the cryptocurrency, using the money system.

There might be other ways to track them down because they exist in the real world and we might be able to recover the money, but the sort of traditional ways that rely on the dollar payment system may not be available.

Senator DAINES. Thank you for that comment.

Mr. Duffie, you can have the last word if you want on this.

Mr. DUFFIE. Well, as has been emphasized, it is very difficult to stop the use of Bitcoin, but you can make it criminal in many different countries if you have an international agreement among countries that Bitcoin will not be permitted to be converted into the local currency; then the criminals will be trapped with owning Bitcoin that they cannot spend. And I think the best thing to do is for the U.S. and other countries to get together and agree that

in none of their countries will Bitcoin be convertible into the local currency.

Senator DAINES. Right. Well, thank you very much for your thoughtful comments.

Madam Chair, this is a great hearing, great discussion, and thanks for holding this hearing.

Chair WARREN. Thank you for joining us.

I want to say thank you for everybody who got a first-round question, and some of us want to do a second round, so I am going to recognize myself to do some questions here.

You know, we have been talking this afternoon about how our banking system has cut out too many Americans for too long. We have nearly 33 million households, disproportionately Black and Hispanic, who are underbanked or unbanked altogether, and they pay steep fees to cash checks and pay bills and borrow a little money until payday.

But as we were talking about earlier, even when people have access to bank accounts, some of those banks use a whole array of abusive practices that harm struggling families like overdraft fees and fake accounts opened without customers' permission and egregious data breaches, just to name a few of these.

So I understand why Americans can be very dissatisfied with the banking industry, and the cryptoindustry has stepped in with the promise of a better and more inclusive financial system for all Americans. The idea is that digital assets and blockchain technology are going to drastically reduce the cost of financial services and improve their quality by eliminating fees and boosting access to capital and providing greater financial privacy and protection.

So, Professor Menand, let me go back to you. I know you agree that our banking system is failing to live up to its responsibilities to the American people, but I want to make sure we get this clearly stated. Do cryptocurrencies offer a safer alternative to the traditional banking system for consumers?

Mr. MENAND. No, Senator, absolutely not. The cryptomarket is rife with consumer abuses. You know, in the traditional financial space, we have regulations and consumer protections in place. Those do not apply in the cryptomarket, so there are companies that offer cryptocustody services that have lost customers money. There are a lot of players that manipulate prices, which leaves ordinary users stuck paying high fees. It is not a safe place to keep your money or to invest.

Chair WARREN. And I understand the FTC has now said that cryptocurrency scams have skyrocketed, and they say that in the 5 months between October 2020 and March 2021, just in that 5-month period, nearly 7,000 people lost more than $80 million, and that is nearly a 1,000-percent increase from the same period a year earlier. And this just happens in brazen cryptocons. So we are seeing egregious fraud cases, but also manipulation in the markets, scams, pump-and-dump tactics.

So, Professor Menand, are there steps that regulators and policymakers could take today to limit the harm to consumers and investors in the cryptocurrency market?

Mr. MENAND. Yes, I think so. So we urgently need more regulation, more funding for regulation, so Congress should increase ap-

propriations for the SEC and for Chairman Giancarlo's former agency, the CFTC, so that, you know, they can keep up with all the new coin schemes that are being launched. You know, Chairman Giancarlo spoke about the race between cops and robbers, as it were. We need to fully fund the cops, or they are going to lose the race. Congress should also give these agencies additional authority over cryptoexchanges, and the banking agencies should not allow Government-backed banks to warehouse these instruments for their customers.

Chair WARREN. OK. That is very helpful. Thank you. You know, it is clear that Congress and financial regulators need to take action to protect consumers, to protect markets, and to protect our financial system.

Dr. Narula, could a well-designed central bank digital currency actually help people who are poorly served by our current banking system?

Ms. NARULA. Thanks for the question, Senator. I think that really depends on how it is designed. So if it is designed in such a way that you require, for example, a commercial bank account in order to transact in the central bank digital currency, it is not really going to provide much help beyond the system that we have today. So I think it is really important to think about accessibility, making sure that it is open, and that people—we remove frictions in the way of people getting access to such a central bank digital currency.

Chair WARREN. Thank you. Big banks are too focused on boosting the multimillion-dollar pay of their CEOs instead of serving their customers. But cryptocurrencies are not the solution that their promoters claim that they are. With no cop on the beat, this unregulated market draws in rip-off artists promising massive returns. Americans need trustworthy and affordable ways to store and use their money, not a way to get scammed more efficiently. A well-designed and carefully implemented central bank digital currency could bring more households into the banking system and ensure that everyone has access to the financial services they need if the design is right. So thank you all.

Senator Kennedy, would you like to do a second round of questions?

Senator KENNEDY. I would, Madam Chair. Can you hear me?

Chair WARREN. I can.

Senator KENNEDY. First, let me thank all our witnesses. You have been terrific. I have got a couple of quick questions. I would like to get all four of you to experience the expertise of each of you, so if you could just give me some brief answers.

Number one, one of the advantages, it seems to me, of, let us say, cryptocurrency, Bitcoin, people like the fact that it is a decentralized ledger. They like the fact that it is private in the sense that the information is encrypted. I guess what I am saying is—let me start with Dr. Narula. Could we establish a digital dollar where the information, the transactions are encrypted using blockchain technology?

Ms. NARULA. Thank you, Senator. Yes, so blockchain technology has gotten a lot of attention, but encryption and techniques like it existed well before the first blockchain, which was Bitcoin. But,

yes, indeed, I think that encryption will form a core part of any central bank digital currency that is launched simply because it is best practice. And it is a very important tool to enable privacy.

Senator KENNEDY. OK. Great. Thank you.

Professor Menand—is "Men-and" or "Men-ahnd"?

Mr. MENAND. "Men-and," Senator.

Senator KENNEDY. Professor, other than—and I am not minimizing what I am about to mention, but other than making our payment system more efficient, cheaper, quicker, what other advantages do you see to a digital dollar? Somebody mentioned the ability of China, through its digital yuan, to access some new commercial possibilities. Maybe you want to elaborate on that. I do not know. I do not mean to give you the answer.

Mr. MENAND. Look, Senator, I think easy and cheaper to transfer, these are the cardinal virtues of a money and payment system. So one response is just what more do you need than a system that—but I would say that offering nondefaultable money with no maximum amount would be stabilizing for the U.S. financial system in ways that people have not thought about. So large companies right out do not have access to that, and it would be very helpful to large companies to be able to hold very, very large cash balances in nondefaultable amounts, and this could crowd out a lot of unsafe and unstable alternative products that those companies use right now. And I think if we call up the CEOs of the top, you know, S&P 500, they would all like to be able to do that to have safer digital money. And that is an additional benefit that is different from easy and cheap to transfer.

Senator KENNEDY. Dr. Duffie.

Mr. DUFFIE. Yes, well, in addition to everything that was mentioned, a central bank digital currency is fungible. It is interoperable. What that means is when I go into your store and I want to pay for something, I do not have to fish around for the correct application or button on my mobile phone to use. When I want to pay a friend for dinner, I do not have to ask him, "Well, do you have Venmo or Zelle, or can I just give you some paper money?" We can just instantly move money back and forth. That makes money move faster. It makes it easier for the central bank to implement monetary policy because when the Fed raises interest rates, for example, or lowers interest rates, interest rates throughout the economy will follow very closely because it is the same kind of money moving everywhere very quickly. So that is an additional advantage, getting the central bank monetary policy implemented well.

And, again, the technology can be exported for commercial advantage to other countries if the U.S. has the technology, but if it waits for China to develop the technology first, then the U.S. is going to lose commercial advantage.

Senator KENNEDY. Chairman Giancarlo, let me ask you this in the few minutes I have left: Does the Federal Reserve have the authority, in your opinion, to do all this unilaterally on its own? Or does it need congressional authority?

Mr. GIANCARLO. Well, rather than my opinion, perhaps what is more important is Chairman Powell's opinion. I think he said recently that the Federal Reserve would require more authority to do this.

Having said that, I think there is a fair amount of authority to do some basic level exploration, work that is already being done at the Federal Reserve Bank of Boston with Professor Narula's help, but also in the private sector, and that is what we are doing at the Digital Dollar Project. We are going to bring the resources of the private sector to bear to do some experimentation, do it on a fully transparent basis, make everything that comes out of our experiments fully available, and do it in a way that it complements the work of the Fed, does not conflict with it, look at some of the social use cases, the commercial use cases, the societal use cases, and, working with responsible actors, make that information available for use by the public sector. Ultimately, these big decisions are going to be made by Congress. They are going to be made by an administration. They are big, weighty issues, but the public does have something to say on these issues, and so we can bring that to bear. Hopefully the decision that comes out is one that meets our social needs and also meets our monetary needs and the core value of money, which is a social good.

Senator KENNEDY. Well, let me thank you all again. It is somewhat unusual to have as many Senators as we had today participate in a Subcommittee hearing like this, and I think that is an indication of how interesting this topic is and the expertise which you bring to it. Thank you all, and I thank our Chair for doing this.

Chair WARREN. So thank you, Senator Kennedy, and with your indulgence, I have one more issue I would like to talk about.

Senator KENNEDY. Absolutely.

Chair WARREN. Good. And you are welcome to do another round of questions if you want.

Senator KENNEDY. Is it about overdraft fees?

Chair WARREN. No. This is a little different.

Senator KENNEDY. I had to ask.

Chair WARREN. OK. Thank you.

We have talked a lot today about the dangers that cryptocurrencies pose to our economy. We have talked about the rip-offs, the instability, the extent to which they are used to help criminals with cyberattacks like the attack on Colonial Pipeline and JBS. But there is another piece, too: the adverse environmental impacts of the computing activity used to mint many of these digital currencies in the first place.

Bitcoin consumes more energy than entire countries, and it is projected to consume as much energy as all the data centers in the whole world this year. One Bitcoin transaction, a single purchase, sale, or transfer, uses the same amount of electricity as the typical U.S. household uses in more than a month.

Senator KENNEDY. Whoa.

Chair WARREN. Yeah. So, Dr. Narula——

Senator KENNEDY. Can you say that again, Elizabeth?

Chair WARREN. Yes. A single Bitcoin transaction—that is, one purchase or one sale or one transfer—uses the same amount of electricity as the typical U.S. household uses in more than a month. I think the estimate is 53 days.

Senator KENNEDY. Wow.

Chair WARREN. Yeah. So, Dr. Narula, could you explain why cryptocurrencies like Bitcoin eat up so much energy?

Ms. NARULA. Certainly, Senator Warren. So what I think is important to note here is that, at least from a computer science perspective, Bitcoin was doing something that we had never done before, which was building a system that was secure enough to support a massive currency, and at the same time allow anyone to participate.

The technique that the creator of Bitcoin used in order to do that, Satoshi Nakamoto, was what we refer to as "mining" or "proof of work." And the idea is that the participants in the Bitcoin network protocol, because we do not necessarily know who they are and we want to make the protocol open for anyone to join without being able to flood the system with copies of a person, for example, is that they prove who they are by contributing compute power.

So the way that Bitcoin works is that in order to build the next block on the blockchain, the participants in the network compete to solve a puzzle. It is a very, very difficult puzzle to solve at the moment, and, in fact, the puzzle difficulty changes depending upon how many participants there are in the network.

What that has led to, as the price of Bitcoin has gone up, is more and more resources being brought to bear, more and more compute resources being brought to bear to solve this puzzle. And as a result, that has used quite a bit more energy. That is also how the blockchain is secured. The idea is that once these participants have expended this energy and expended this compute power, in order to rewrite the blockchain, in order to change history, one would have to expend an equivalent amount of power and energy. So it is a pretty fundamental part of the underlying security of Bitcoin.

Chair WARREN. So it is built right into it that there are computers all over the world right now spitting out random numbers around the clock in a competition to try to solve a useless puzzle and win the Bitcoin reward. And the amount of computational power and energy for this is a disaster for our planet.

Now, some cryptoadvocates claim that these environmental costs are worth it because of the security the proof-of-work validation process provides to the system. And you were talking about this. This is the security that is built in.

But let me ask you, Professor Menand, do you think the environmental costs inflicted by cryptocurrencies like Bitcoin are worth whatever potential benefits they provide?

Mr. MENAND. No, absolutely not, especially for countries like the United States where the benefits of crypto are largely illusory. They are not a better means of payment. They undermine the Government's ability to maintain robust economic growth over time. They circumvent important safeguards that we have been talking about that prevent extortion. And the environmental costs are very, very large, and so I think the cost-benefit analysis on Bitcoin is clear.

Chair WARREN. All right. So let me ask you, then, Professor Menand, what is the endgame for Bitcoin? Will more and more miners keep doing more and more useless, complicated math problems that consume a larger and larger share of the world's energy for the next 100 years until the last coin is mined? What is the future of Bitcoin and the future of our planet?

Mr. MENAND. I think a lot depends on how the people in this Zoom react. You know, if Governments like ours continue to sit on the sidelines while alternative currency systems develop or even if they give succor to that development, we are going to see Bitcoin use continue to expand because there is a growing group of people who would like to move sort of the whole financial system to decentralized ledgers. And that is going to mean more and more environmental damage, so Congress, I think, really needs to act here.

Chair WARREN. Yeah. So as we think about how to build a better banking system, we need to rethink the use of environmentally wasteful cryptocurrencies. If I can, let me just get through these quickly.

Dr. Narula, let me ask you, from the research you and your colleagues at MIT have done, is it possible to design a central bank digital currency that does not require miners to perform random number generation puzzles?

Ms. NARULA. Yes, it is.

Chair WARREN. And could you design it so it would not consume more energy than a middle-size country?

Ms. NARULA. Yes, you can.

Chair WARREN. And could we have a central bank digital currency that does not exacerbate the climate crisis and undermine environmental justice?

Ms. NARULA. I think you could build a central bank digital currency which does not consume vast amounts of energy, yes.

Chair WARREN. Good. I am glad to hear this.

Look, cryptocurrencies like Bitcoin are terrible for the environment, and that would be true regardless of whether we were getting anything productive out of that energy usage or not. The fact that we are not makes it even more scandalous.

One of the easiest and least disruptive things we can do to address the climate crisis is crack down on environmentally wasteful cryptocurrencies, and now is the time to do it. So I want to thank all of our witnesses for being here today. I want to thank you for providing testimony. You have just been terrific.

I want to——

Senator KENNEDY. Madam Chair, can I ask Dr. Narula one other question?

Chair WARREN. Of course. Of course, you can.

Senator KENNEDY. It is in line with the ones you—I just want to follow up one last question in line with your questions. Can we design that digital currency in a way that respects people's privacy?

Ms. NARULA. I certainly hope so, Senator Kennedy, and I think if we cannot design it in such a way, then that is a very important factor to take into account when considering whether to launch. But my hope is that we can, and that is the research that we are engaging in now.

Senator KENNEDY. Thank you.

Senator CORTEZ MASTO. And, Madam Chair, if it is all right, I have a follow-up to that.

Chair WARREN. Of course. Senator Cortez Masto.

Senator CORTEZ MASTO. Dr. Narula, you have been at this for a period of time, so can you talk about, with respect to digital cur-

rency, why you recommend that the platform have an open application programming interface?

Ms. NARULA. Yes, Senator, I think this is critical. So I do not think that we will realize the true benefit of digital currency unless we upgrade it into the 21st century, so to speak. We have another particular here to learn from what has happened in the cryptocurrency world, and I understand a lot of the Senators here are not big fans of that world. But what I see there is a lot of very exciting applications that are being built and a lot of experimentation that is happening that, granted, also comes along with a lot of scams.

However, I think we would be missing an opportunity if we did not take a look at what was happening there and try to learn lessons from the cryptocurrency world and bring some of that back into a central bank digital currency design. I think that if we were able to create a well-designed interface to a central bank digital currency, we could do for the transfer of value what the Internet did for the transfer of information, which is create a platform for innovation, so create a platform where we could have new applications and new businesses facilitating the transfer of value in exciting new ways.

Senator CORTEZ MASTO. Yes, but, if you would, talk a little bit about the security piece of that, because that means there are more eyes. When you have an open application program interface, there are more people engaged in watching what is going on that you bring more of that security. Is that correct?

Ms. NARULA. Absolutely. So I am a firm believer that open-source software is critical for security. The more people who are looking, the more likely you are to find bugs and to find problems.

Senator CORTEZ MASTO. Along with the innovation, but there is the security?

Ms. NARULA. Yes, Senator.

Senator CORTEZ MASTO. Thank you so much.

Thank you, Madam Chair. Thank you, Ranking Member.

Chair WARREN. You bet.

Anyone else have a question? Are we good?

[No response.]

Chair WARREN. Good. Well, as I was saying, I want to say thank you to our witnesses. Obviously, you were very engaging today, and I appreciate your being here. I want to thank Senator Kennedy for being such a great partner and for suggesting this hearing. Thank you, Senator Kennedy.

For any Senators who want to submit questions for the record, those questions are due a week from today—that is, Wednesday, June 16th.

For our witnesses, you will have 45 days to respond to any of those questions. And, again, thank you very much.

With that, this hearing is adjourned.

[Whereupon, at 4:22 p.m., the hearing was adjourned.]

[Prepared statements, responses to written questions, and additional material supplied for the record follow:]

PREPARED STATEMENT OF CHAIR ELIZABETH WARREN

Good afternoon, and welcome to this session's second hearing of the Economic Policy Subcommittee. Today's hearing focuses on the opportunities presented by a central bank digital currency. This is a bipartisan hearing—in fact, it was Ranking Member Kennedy's suggestion to hold it—and I want to thank him and his team for working so closely with us to put it together.

The core subject of this hearing is not Bitcoin, or Dogecoin, or any other cryptocurrency. But the explosion of cryptocurrencies over the last decade creates the context for understanding the potential value and risks of digital currency.

There are substantial difficulties with our current payment systems. Nearly 33 million Americans have been locked out of the traditional banking system. They are forced to use check cashers and payday lenders for basic banking services. And even those with traditional checking and savings accounts find that many of the largest banks have proven to be untrustworthy, gouging customers for overdraft and other fees or, in the case of Wells Fargo, outright cheating their customers with fake accounts and fake services for which customers paid dearly.

What are the alternatives? Digital currencies have been hyped as a solution to these problems. Early advocates claimed that cryptocurrencies would open up the financial system and deliver fast, cheap, and secure payments to anyone with an internet connection. Others pointed out that crypto was a way to avoid the risks of dealing with the giant banks that squeezed customers dry.

But crypto's promises haven't come to pass. Instead, here's what's happening in the real world with cryptocurrencies: Cryptocurrencies have turned out to be a fourth-rate alternative to real currency.

First, cryptocurrencies are a lousy way to buy and sell things. Unlike the dollar, their value fluctuates wildly depending on the whims of speculative day traders. In just the last 2 months, the value of Doge coin increased more than ten-fold. Then declined by nearly 60 percent. That may work for speculators and fly-by-night investors—but not for regular people looking for a stable source of value to get paid in and to use for day-to-day spending.

Second, crypto is a lousy investment. Unlike, say, the stock market, the cryptoworld currently has no consumer protection—none. As a result, honest investors and people trying to put aside some savings are at the mercy of fraudsters. Pump and dump schemes are outlawed in the case of ordinary stock, but they have become routine in cryptotrading. One study found that the level of price manipulation in cryptocurrency is—and I quote—"unprecedented in modern markets."

Third, crypto has become a haven for illegal activity. Online theft, drug trafficking, ransom attacks, and other illegal activity have all been made easier with crypto. Experts estimate that last year more than $412 million was paid to criminals in ransom through cryptocurrencies. Unlike other payment systems that make it tougher to move money illegally, a key feature of crypto is its secrecy. In just the past few weeks, cryptocurrencies made it possible for hackers to collect a ransom to release the Colonial pipeline hack and to free JBS, the world's largest meat producer, from a paralyzing cyberattack. And every hack that is successfully paid off with a cryptocurrency is an advertisement for more hackers to try more cyberattacks.

Finally, there are the environmental costs of crypto. Many cryptocurrencies are created through "proof-of-work" mining that involves using computers to solve useless mathematical puzzles in exchange for newly minted cryptocurrency tokens. Such mining has devastating consequences for the climate. Some cryptomining is set up near coal plants, spewing out filth in return for a chance to harvest a few cryptocoins. Total energy consumption is staggering, driving up demand for energy. If, for example, Bitcoin—just one of the cryptocurrencies—were a country, it would already be the 33rd largest energy user in the world—using more energy yearly than all of the Netherlands.

And those promised benefits—the currency that would be available at no cost to millions of unbanked families and that would provide a haven from the tricks and traps of big banks—those benefits haven't materialized.

Meanwhile, cryptocurrency has created opportunities to scam investors, assist criminals, and worsen the climate crisis. The threats posted by crypto show that Congress and Federal regulators can't continue to hide out, hoping that crypto will go away. It won't. It's time to confront these issues head on.

Crypto has significant problems, but our current payment system also has significant problems. Both the Government and banks have dragged their heels for years, resisting innovation and evidently taking the same hide-and-wait approach to facing the worldwide movement into cryptocurrencies.

Central bank digital currency—often called CBDC because the world needs another acronym—has great promise. Legitimate digital public money could help drive out bogus digital private money, while improving financial inclusion, efficiency, and the safety of our financial system—if that digital public money is well-designed and efficiently executed, which are two very big "ifs."

I'm looking forward to hearing from our witnesses today about how a central bank digital currency would work, why it might be necessary, how it intersects with cryptocurrency, and—most importantly—how it should be set up so that all Americans can enjoy its benefits.

PREPARED STATEMENT OF SENATOR JOHN KENNEDY

Thank you, Chairman Warren. This is a very important topic, and this hearing is an opportunity to explore if a Central Bank Digital Currency (CBDC) would work for the United States and what additional value a CBDC could provide to U.S. monetary policy.

As technology emerges in the payment system, the demand for digital payments and the influx of nonlegal tender, like cryptocurrencies, has exploded. These forms of payments have operated outside our traditional payments infrastructure and have proved to be volatile, controversial, and even speculative, as it has been with Bitcoin.

Further, with cryptocurrencies and stablecoins on the rise, we need to examine the risks that a decentralized currency would pose to the Federal Reserve's control of monetary policy.

The U.S. is leading the world in innovation and technology, and the U.S. dollar has remained the world's primary reserve currency.

As many Governments around the world are exploring a CBDC for use in today's digital world, so should the United States. However, moving forward, we must understand whether public demand exists, who stands to benefit most from a CBDC, and if the juice is worth the squeeze when it comes to cost and security risks.

China has created its own digital currency, the digital yuan, which it uses to monitor the everyday transactions of its citizens, and to broaden its massive surveillance system. Additionally, China's using its CBDC to maintain greater control over its economy and grow China's monetary influence in the world.

The United States must analyze the implications of a Chinese CBDC on global competitiveness, international commerce, and what that means for the U.S. dollar's position as the global reserve currency.

Security must be the foremost priority during any consideration of a CBDC. As the Federal Reserve looks to develop a digital currency, ensuring a safe network while prioritizing privacy for consumers must be first achieved.

Additionally, I am very concerned with proposals that would use CBDC to fundamentally change the current banking system. CBDC should not replace the paper dollar, or bank deposits. If the U.S. chooses to hold a CBDC, it should do so in a way that complements our current financial system.

We must strike the right balance, and I look forward to that discussion. In closing, I would like to thank the witnesses for being here and lending your expertise on the issue. With that, I turn it over to Chairman Warren. Thank you.

PREPARED STATEMENT OF NEHA NARULA

DIRECTOR, DIGITAL CURRENCY INITIATIVE, MASSACHUSETTS INSTITUTE OF TECHNOLOGY

JUNE 9, 2021

Thank you Chair Warren, Ranking Member Kennedy, and Members of the Subcommittee, for the opportunity to testify today.

My name is Neha Narula and I am the Director of the Digital Currency Initiative at the Massachusetts Institute of Technology. We are a research group based within the MIT Media Lab focusing on cryptocurrency and digital currency design and implementation, addressing challenges in security, scalability, and privacy. I have taught five graduate cryptocurrency courses across departments at MIT and during the course of my Ph.D. work I conducted research in MIT's Computer Science and Artificial Intelligence Laboratory on databases and distributed systems. Last year we began a research collaboration with the Federal Reserve Bank of Boston on Project Hamilton, to engage in research to understand the technology tradeoffs involved in a hypothetical digital currency. I'd like to note that my views are my own,

and not the views of MIT, the Board of Governors, or the Federal Reserve Bank of Boston, nor am I offering any insight into Federal Reserve policy or perspectives.

The Problem and Opportunity

Traditional electronic transaction systems today have high fees, limit access, and have not evolved fast enough to keep pace with the demand for online digital payments. Our legacy payment rails require expensive delays because they were created at a time when the technology did not support settling every transaction in real time, and the pace of updates has been slow due, in part, to structural problems in the payment ecosystem making it difficult to coordinate large-scale change.

At the same time, we are seeing experimentation in the realm of cryptocurrencies built on open networks which do not require a traditional financial intermediary. This area serves as a laboratory showing what innovation and functionality might be possible if we were not constrained by legacy financial rules and systems. However, this area is still developing and comes with many risks, not least of which is the immaturity of the technology and its ability to provide widely available, highly secure, and scalable payment transactions. This is an active area of research where my group spends much of its time.

For these and other reasons central banks across the world are considering issuing digital forms of their currency to the public. A Bank for International Settlements survey of 65 central banks found that 86 percent are actively engaging in some sort of work on Central Bank Digital Currency (CBDC), for reasons including improving payment efficiency and robustness, facilitating financial inclusion, and maintaining financial stability. [1]

It is important to note that a CBDC might not be the only way to address some of these problems; for example, in the U.S. we might improve financial inclusion by requiring commercial banks to provide free, no-minimum accounts to users, or by limiting or eliminating fees, as these were some of the reasons listed when the U.S. unbanked were asked why they don't have bank accounts. [2] Determining how a CBDC might compare to other approaches to solving financial inclusion issues, and how exactly we could build a CBDC to be effective in addressing these challenges are still significant open areas of research requiring time and investment. At MIT we are beginning to investigate the possibilities of CBDC as a vehicle for increased financial inclusion, but as of yet, the promise is unverified in either a U.S. or global context.

The potential promise of a CBDC goes beyond payment efficiency and financial inclusion. Digital currency is an opportunity for a ground-up redesign of our legacy payment systems. If designed in the right way, a system to create and support a digital dollar might increase competition and standardize disparate data models, leading to more interoperability and creating a platform for innovation in payments, much as the Internet created a platform for innovation on top of the transfer of information. It is possible that in this redesign additional opportunities for increasing financial inclusion and solving challenges in the legacy financial system will also be uncovered.

Though promising, the way forward is not entirely clear. There are many remaining open questions regarding how a U.S. CBDC should operate, how users might access it, and how to protect consumer privacy. In what follows I offer a few of the choices to be made in how the United States might issue a digital dollar. It would be irresponsible to consider launching a digital dollar until we can make progress on these questions, but addressing them will require investment now, and extensive collaboration between academic researchers and the public and private sectors.

How We Should Think About International Exploration of CBDC

Other countries have issued a CBDC, are considering issuing one, or are exploring CBDC viability for different reasons. For example, in October 2020 the Central Bank of the Bahamas issued the Sand Dollar to promote financial inclusion and access. Sweden is exploring an e-krona because of the decline in the use of cash in payments, and the Riksbank wants to continue its mandate of providing a public option for payments. The People's Bank of China is engaging in late stage digital currency pilots and might launch the eCNY [3] to, in part, bring China's massive

---

[1] Boar, Codruta, and Andreas Wehrli. "Ready, Steady, Go? Results of the Third BIS Survey on Central Bank Digital Currency". (2021).

[2] FDIC. "How America Banks: Household Use of Banking and Financial Services". FDIC Survey (2019).

[3] In China there have been mixed messages as to whether the eCNY even is a CBDC: Former PBOC Governor Zhou Xiaochuan said in December 2020 that eCNY would not be a liability of

Continued

fintech industry back under the umbrella of the central bank after the enormous success of payment platforms like Alipay and WeChat Pay, which together comprise 93 percent of mobile payments in China.[4] Each of these countries is using a different technology stack and has made different initial choices in how to involve commercial banks and how the CBDC might be accessed by users.

Currencies compete; it is certainly possible that consumers might be attracted to a digital currency which is easy to use, has no or low fees, and comes with interesting features. But the concerns of the United States are unique in that the dollar plays a critical role in the global economy as the world's reserve currency. The once in a century opportunity to redesign the U.S. dollar should not be rushed. It is important to carefully consider how we might want a U.S. digital dollar to operate and what effect different choices will have on accessibility, overall financial stability, and the potential for a U.S. digital dollar to be a platform for innovation.

What Is a CBDC?

A general purpose, or retail, CBDC is defined as a digital liability of the central bank which is broadly accessible and usable by the general public. It is distinguished from commercial bank money, credit cards, and mobile payment application balances in that it is a liability of the central bank, it is different from cash in that it is entirely digital, and it is different from central bank reserves in that users might hold it directly. This is in contrast to what is known as wholesale CBDC, which is a digital liability of the central bank which is limited to certain financial institutions and is not available to the general public.

From this basis, definitions start to vary widely. Some purport that a CBDC must be built on distributed ledger technology; this is putting the cart before the horse. We should first determine how a CBDC should operate before choosing an implementation technology. Also, it is important to distinguish between the underlying datastore of a CBDC implementation, and the interface to the CBDC and how it is intermediated and accessed. These different aspects are often conflated under the general term "distributed ledger technology." For example, a CBDC could act as a legal bearer instrument with a programmable interface even if it is built on top of traditional database technology.

Accessibility: How Is the CBDC Accessed and Managed?

In order to achieve goals of financial inclusion, a CBDC should be broadly accessible and usable. Every point of intermediation involved in a user obtaining and using CBDC is another potential friction that could inhibit access.

For example, international studies on financial inclusion have shown that requiring strong forms of identification prohibits the poor from accessing financial services.[5] One of the benefits of cash is that it can be used by anyone without requiring identification or signing up for an account, which is, in part, what makes it the payment system of choice for the poor. However, at the same time, policymakers would like to limit the potential use of CBDC in illicit activity. One way to address this tension is by creating tiers of access which require different levels of identification. In the Bahamas, there is a low-value tier of access to the Sand Dollar that requires only an email address or mobile number to sign up, but limits balances to $500 and transaction volume to $1,500 per month.[6]

It is important to consider users who might not be able to use mobile payment applications; in the U.S., 36 percent of the unbanked do not have smartphone access.[7] To help with financial inclusion, a U.S. CBDC could be available via smart cards, which could limit certain aspects of its design. We also cannot expect even U.S. users to have consistent internet connectivity; my research team is prioritizing designs which allow some forms of secure offline transactions.

---

the PBoC, contradicting statements by Mu Changchun, Director-General of the Digital Currency Institute at the PBoC, and Fan Yifei, Deputy Governor at the PBoC.

[4] Zhang, M. "China Moves Further Towards Cashless Society as Payment Giants Alipay, WeChat Pay Gain Ground". Retrieved from *South China Morning Post*: *www.scmp.com/business/companies/article/2130400/ china-movesfurther-towards-cashless-society-payment-giants*. (2018).

[5] Demirguc-Kunt, Asli, Leora Klapper, Dorothe Singer, Saniya Ansar, and Jake Hess. "The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution". The World Bank, 2018.

[6] Central Bank of the Bahamas. "Consumer-Centric Aspects of the Proposed Regulations for the Bahamian Digital Currency". (2021).

[7] FDIC survey.

Data Protection: What Data Is Visible to Whom, and Under What Circumstances?

Transaction data can vary widely; at minimum it includes sender and recipient, amounts, and the time of the transaction. Some transaction systems collect user data like name, date of birth, social security number, and address, or other passive information like a user's IP address, GPS location, browser, or mobile operator. All of this information can then be used to track users and build profiles of their habits and behavior across websites and applications.

Financial data can reveal uncomfortable information about a consumer's preferences and habits; our finances give a window into our lives. Any U.S. CBDC should prioritize user privacy and data protection. In addition, collecting and storing personally identifying user data at all makes it vulnerable to accidental leaks or malicious hacking attempts, so the design of a U.S. CBDC should strive to minimize data collection to only what is critically necessary to safely process transactions.

The private sector has an incentive to collect and monetize all these different forms of data. Whether through regulation or by providing a public option, we must consider how to protect user data. In particular, it should not be the case that those who can afford it can pay for services which protect their data while the poor are left to services which monetize them.

A CBDC which is in some part run by the central bank does not necessarily require the central bank to have visibility into fine-grained transaction data. Legitimate public policy goals relating to combating criminal activity can be fulfilled while preserving the privacy of the public and preventing a central bank being drawn into the commercial surveillance models which are now prevalent in the private sector. [8]

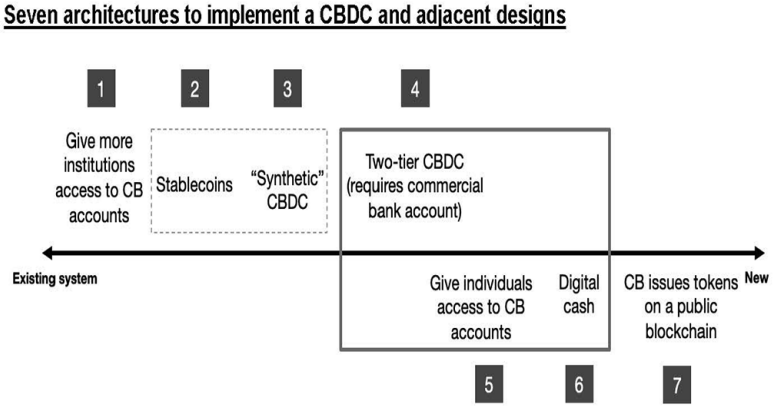


Figure 1. Collection of seven different architectures proposed for and adjacent to a general purpose central bank digital currency. The dotted box encompasses architectures that do not fit the definition of CBDC given above, in that they are not liabilities of the central bank. The solid box contains the most common architectures proposed for retail CBDC. CB is "Central Bank".

Figure 1 shows seven different architectures to consider in CBDC design, ranging from those closer to our existing system to entirely new models for accessing central bank currency. For each architecture I describe its potential to improve financial inclusion and to serve as a platform for innovation.

Under the basic definition given earlier, we already have wholesale CBDC since financial institutions hold electronic balances with the Federal Reserve. The first design is to simply expand access to the Federal Reserve balance sheet to a larger set of institutions, for example by extending access to mobile payment application providers. This might reduce settlement costs and improve competition, and through that, improve access and innovation, though it will also require increased regulatory scrutiny of these new participants, which might limit their ability to provide ac-

[8] Ali, Robleh, and Neha Narula, "Redesigning Digital Money: What Can We Learn From a Decade of Cryptocurrencies". Digital Currency Initiative, MIT Media Lab (2020).

counts to those currently left out. It is not clear it will help promote interoperability and standards, leading to a platform for innovation.

The next two proposals shown in Figure 1 do not fit under the definition of CBDC provided above in that they are not direct liabilities of the central bank: One option is to expand support and regulatory clarity for so-called stablecoin providers, who issue dollar-pegged tokens on public or permissioned blockchains. These fall into two categories: Those that are 1:1 backed by commercial bank deposits or other relatively stable, liquid assets like U.S. Treasuries, and algorithmic stablecoins which operate in a smart contract on a public blockchain, and are usually heavily overcollateralized using cryptocurrency assets or other stablecoins, with the peg managed by a software algorithm running in the smart contract. To date, U.S. dollar-denominated stablecoins have a market capitalization of over $100B, with the vast majority of that value in the first category.[9] They appear to be primarily used as a mechanism for facilitating cryptocurrency trading and I am not aware of any rigorous evidence that stablecoins help improve financial inclusion, though this is an area deserving more research. Architecture 3 is what the IMF deems "synthetic" CBDC, in that it is issued by commercial banks and not actually a liability of the central bank, but is backed 1:1 by central bank reserves.[10] It is also unclear exactly how this architecture might help promote access and financial inclusion beyond our existing system, or become a platform for innovation.

Architectures 4, 5, and 6 (contained in the solid box) are the most discussed designs for CBDC, though there are still many choices and variations within these proposals. Architecture 4 is deemed "two-tier" CBDC in that it is expected that the CBDC will only be accessible through commercial banks.[11] This implies that a user will need to obtain an account with a commercial bank in order to receive and transact in the CBDC. This design is appealing because it preserves the current structure in electronic payments, but at the same time, it is unclear how this design alone will help promote financial inclusion in the U.S. because it does not appear to address the main reasons why the unbanked do not use banks. Figure 2 is copied from Figure ES.3 from the FDIC's 2019 survey on "How America Banks: Household Use of Banking and Financial Services" and shows survey responses for why unbanked households do not have bank accounts. The success of this architecture in addressing financial inclusion will depend on exactly how commercial banks would administer CBDC accounts; if it is not different from how they administer traditional checking accounts, they are unlikely to address any of the unbanked's concerns.

How successful this design will be in providing a platform for innovation also depends on whether or not the commercial banks cooperate to provide compatible APIs (Application Program Interfaces) to facilitate building new applications that transfer CBDC. Under the status quo it is unlikely a two-tier CBDC would help promote innovation in payments, since commercial banks currently do not provide these interfaces widely and do not interoperate.

---

[9] *https://coinmarketcap.com/view/stablecoin/*

[10] Adrian, Tobias, and Tommaso Mancini-Griffoli. "The Rise of Digital Money", *Annual Review of Financial Economics* 13 (2019).

[11] The CBDC might also be available through additional regulated financial service providers. We should compare and contrast this type of two-tier model with the benefits and risks of the first architecture, which is expanding the set of institutions that can access the central bank's balance sheet, without issuing a new form of CBDC.

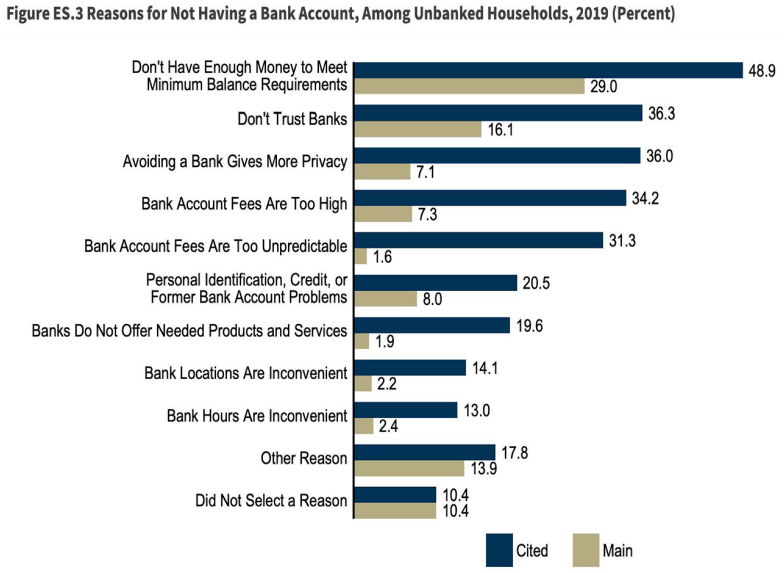


Figure 2. Source: FDIC survey on How America Banks: Household Use of Banking and Financial Services[12]

Architecture 5 is also known[12] as FedAccounts: giving retail users the option of holding an account directly with the Federal Reserve, a privilege currently limited to regulated financial institutions. The authors of the FedAccounts proposal have written extensively on how the proposal might help with financial inclusion.[13] It is unclear whether or not the FedAccounts proposal would promote innovation in payments beyond improving competition.

Architecture 6 is what we deem digital cash: a CBDC that can be held directly by users without requiring an intermediary commercial bank account. It is important to note that a digital currency cannot be entirely peer-to-peer as is cash; digital information, unlikely physical objects, can be easily copied, so at some point a recipient needs to check that the payment they are receiving has not already been previously spent (this is called a "double spend"). One option for doing this is to employ secure hardware, which will prevent the double spend in the first place; however, this requires relying on the correctness and integrity of secure hardware implementations, which might have bugs. The more common way is to reconcile with a ledger managing the issuance of the digital currency. There is a lot of leeway in the design of how exactly that ledger is accessed and when, and what controls that ledger has in terms of permitting, denying, or reversing transactions. In a CBDC designed to look more like digital cash, the ledger could simply prevent double spends.

This architecture could improve financial inclusion if it is easy to use and implemented in a way that is widely accessible, because it would not necessarily require users to sign up for accounts to receive payments,[14] and users would have an already existing mental model (cash) for how it works and how to use it. Note that banks or other third-party providers could custody digital cash for users, if desired. This architecture could also provide a standard to use as a layer of interoperability among payment providers, promoting a platform for innovation. At MIT, we are currently actively researching how to design safe, efficient, and useful digital cash.

Architecture 7 is proposed by some blockchain advocates; they suggest that a central bank issue digital currency on an existing blockchain system. This might be a smart contract platform like Ethereum or a permissioned blockchain like Facebook's

[12] FDIC survey.

[13] Ricks, Morgan, John Crawford, and Lev Menand. "Central Banking for All: A Public Option for Bank Accounts". *The Great Democracy Initiative Report* (2018).

[14] Identity checks could be done depending on the amount transacted, as described earlier.

Diem. Under this type of architecture, a central bank could control issuance of the digital currency, but would give up all other control to the governance of the underlying blockchain. For example, the participants in the blockchain network might decide to reverse a transaction, as happened in Ethereum after one of its smart contracts, the DAO, was hacked. Ethereum developers, miners, and community members cooperated to reverse the hack and restore funds.[15] It is extremely unlikely any central bank would want to put this level of control in the hands of blockchain operators. Blockchain networks are open and accessible and have high levels of innovation, though there has not necessarily been a concerted effort to add features to support financial inclusion.

All of these architectures need to be carefully evaluated for their potential to improve financial inclusion, risks and complexity of implementation, monetary and economic implications, and the potential to affect the cost of credit and financial stability.

Conclusion

Central bank digital currency might have the potential to increase financial inclusion, reduce transaction costs, and become a platform for innovation in payments, if designed and implemented in the right way. In order to determine and realize these benefits we must first invest deeply in multidisciplinary research and development. I commend this Subcommittee for raising this important issue and encouraging this critical dialogue. Thank you and I look forward to your questions.

PREPARED STATEMENT OF J. CHRISTOPHER GIANCARLO

SENIOR COUNSEL, WILLKIE FARR & GALLAGHER

JUNE 9, 2021

Thank you, Chair Warren, Ranking Member Kennedy, and Members of the Subcommittee, for the opportunity to testify today.

I am Chris Giancarlo, Senior Counsel at Willkie Farr & Gallagher. I am also the former Chairman of the U.S. Commodity Futures Trading Commission.

I am here today on behalf of the Digital Dollar Project,[1] a nonpartisan think tank furthering public consideration of the merits of a tokenized form of a United States central bank digital currency (CBDC).

The Digital Dollar Project

The Digital Dollar Project was launched in early 2020. It seeks to serve the public interest by convening private sector thought leaders and actors, encouraging U.S. based research and public discussion on the opportunities and challenges of CBDC, and proposing possible models to support the public sector as it considers development, testing and adoption.[2] The Project looks to advance consideration of ways to future-proof the dollar for consumers and institutions here in America and around the world.

To gain diverse perspectives from key stakeholders, the Digital Dollar Project formed a nonpartisan advisory group that includes a broad array of economists, business leaders, technologists, innovators, lawyers, academics, and consumer advocates across the social and political spectrums.[3]

Working with this Advisory Committee, the Digital Dollar Project released its inaugural white paper at the end of May 2020.[4] (I ask that a copy of the Project's white paper attached hereto be made a part of the record of this hearing.)

The Digital Dollar Project white paper proposes for public consideration and discussion a model of a tokenized digital dollar that we refer to as a "champion model." It provides details on the structure, operation, and benefits of that champion model of a digital dollar. It posits a tokenized form of the U.S. dollar enjoying the full faith and credit of the U.S. Government operating alongside existing forms of physical cash and commercial bank money.

---

[15] DuPont, Quinn. "Experiments in Algorithmic Governance: A History and Ethnography of 'The DAO,' a Failed Decentralized Autonomous Organization". *Bitcoin and Beyond* (2017): 157–177.

[1] *https://www.digitaldollarproject.org*

[2] The Digital Dollar Project is not a commercial enterprise and has no business model to promote. It operation is self-funded. Its founders are the Digital Dollar Foundation, a not-for-profit enterprise and the global consulting firm, Accenture PLC.

[3] Members of the Advisory Board are listed here: *https://www.digitaldollarproject.org/advisory-group.*

[4] "Exploring a U.S. CBDC: A White Paper", Digital Dollar Project, May 2020, at: *https://digitaldollarproject.org/exploring-a-us-cbdc/*.

Importantly, the Digital Dollar Project's champion model proposes that the issuance, distribution and redemption of digital dollars would take place just as cash does today: issued by the Federal Reserve to domestic banks or regulated entities against reserves. It supports maintenance of the existing two-tiered architecture of commercial banks and regulated money transmitters in deploying and recording Digital Dollars on new transactional infrastructure informed by distributed ledger technology (DLT).

The Project's white paper proposes that commercial banks would distribute Digital Dollars to domestic end-users' digital wallets against bank deposits and against collateral to nonresident banks. For consumers, digital wallets would offer essential payment functionalities integrated with existing banking services. Payments at points of sale could still be conducted through conventional terminals or fully contactless solutions. Only, with Digital Dollars, the terminals would transfer actual value from peer to peer instead of the electronic messages we use today. Regulated entities would extend such wallets to their customers through existing outlets for mobile phone applications. For unbanked end-users, wallet services could come preloaded on mobile phones.

The Project's Digital Dollar proposal is not antithetical to other virtual currency efforts whether commercial like Diem or decentralized like Bitcoin. The proposal is also monetary policy neutral. It takes no view on issues of money supply. It proposes the Digital Dollar as a tool of monetary policy, not a policy expression.

Central Bank Digital Currencies: Decentralized Fiat Money

Among the multitude of highly effective payment options in the United States (e.g., cash payment, credit, debit, etc.), a Digital Dollar could offer a new choice for digital transactions, instantaneous peer-to-peer payments, and in-person transactions. It could also potentially lower costs and further diversify payment rails. It would facilitate financial inclusion by broadening access to services through additional mechanisms, such as digital wallets. In particular, a U.S. CBDC could expand the ability of currently un- or underbanked populations to access digital financial services and transact on ecommerce platforms that do not deal in physical cash.[5]

The Digital Dollar Project proposes that the Digital Dollar would operate on a likely permissioned network to ensure validity and integrity of all transactions and would necessarily be built against the highest standards of systemically important infrastructure. The verification of transactions would rest on the complete history or lineage of the tokens from original issuance in order to attest authenticity and that they have not been double spent. The advantages of tokens derive from their bearer instrument nature and the ease with which interactions with existing banking and payment functions can be performed. Participants only need to interact with the tokens and are not required to be connected to a payment system. Tokens can be exchanged multiple times "offline" and would resync with the system when connectivity is available enabled by the logic encapsulated in the tokens themselves.

DLT network participants would include the central bank and commercial banks, other financial intermediaries, and new entities that can help afford greater resilience in payment processing. The distributed nature of the DLT platform would enhance security as manipulation of the network would be computationally near impossible. The DLT platform would add to payment system diversification by operating on separate Internet-based payment rails that is complimentary to the existing banking system.

A U.S. Digital Dollar would be far superior to Bitcoin in environmental sustainability. A Digital Dollar would not need to be "mined" consuming enormous amounts of energy to demonstrate proof of work and earn newly minted coins. Instead, Digital Dollars would be created cryptographically by the Fed and distributed electronically. Such distribution would make a Digital Dollar environmentally superior even to our current use of fiat money that has an overlooked environmental cost in the operation of electronic ATMs and the physical mining, minting and distribution of notes and coins.

Financial Inclusion

One area of great promise with respect to a Digital Dollar is in expanding financial access and inclusion for unbanked populations. A 2017 Federal Deposit Insurance Corporation survey found that roughly 14 million American adults lack a bank account—a figure that has become all the more important during the COVID–19

[5] Bank notes are often used to make small payments in the physical world, although, on average, physical cash usage is in decline compared against other payment methods. This dynamic is likely to progress in a post-COVID–19 world, thereby making it increasingly important for digital financial options to extend more broadly.

lockdown.[6] The pandemic revealed fundamental shortcomings in the capacity of existing Government payment relationships to swiftly channel financial resources to the nonbanked public. The U.S. Federal Reserve has no direct relations or connectivity with the nonbanked public. It cannot therefore efficiently distribute or coordinate crisis relief directly to deserving households short of paper checks that are costly to convert to cash. Away from the Federal Reserve, Federal and State government agencies have only partial direct banking relationships with the general public through tax administration and social benefits distribution, but their reach is not universal.

Had a Digital Dollar been in circulation during the COVID–19 crisis with a means of digital identification, it would have enabled the immediate sending of monetary relief to the digital wallets of targeted beneficiaries.

During noncrisis conditions, a Digital Dollar could be a useful tool in the distribution of other Government assistance payments, such as social security benefits, school meal vouchers and food stamps, among others. It may also serve to expand financial inclusion for underserved populations due to lower system costs and the ready availability of digital wallets. Given their relatively limited but critical functionality, there is greater precision and efficiency associated with digital wallet services that policymakers should consider, particularly given the broad range of programs and Government benefits that can be distributed utilizing wallet services and the historic waste and abuse that could be eliminated. This would also allow private sector providers certain opportunities and advantages to expand coverage of such services to un- or underbanked populations that have access to mobile devices.

In order for this to be true, however, the digital wallet will need to prove to be less expensive to offer from a technology, telecommunications, regulatory, and administrative perspective, and with manageable risk, particularly with respect to privacy and security. This hypothesis can be tested in real-world pilot programs. In situations where private sector solutions are not viable, policy solutions could be developed around public wallet Government programs or services that fill remaining gaps in coverage.

Assuming the technological efficiency and potentially reduced regulatory costs associated with offering a digital wallet, one can imagine smart phones and devices preloaded with such a solution, or at a minimum, the application programming interfaces to allow for mobile applications to function. The wallet could be readily registered through a regulated hosting intermediary performing requisite Know Your Customer/Anti–Money Laundering (KYC/AML) checks. Because not everyone always has a cell signal where they live, end-users could make in-person CBDC transactions offline that upload to the network as soon as they regain cellular service.

In fact, development of a Digital Dollar along with smart phone wallet services may be only the starting point for financial service providers to offer new and more beneficial services for populations that have historically been underserved by traditional banking services. Georgetown University Law Professor Chris Brummer has written:

> . . . the potential advantages of a tokenized dollar from the standpoint of financial inclusion are impossible to ignore . . . . The supporting rails for a digital dollar could be opened up to other kinds of applications that could help contribute holistically to a transformation of the very model of financial inclusion, . . . [including] services like Government sanctioned digital IDs, alternative credit scoring tools, and savings programs. even robo-advising and financial education services for low-income people.[7]

The Digital Dollar Project believes the opportunity is at hand not just to imagine such an ecosystem, but to actually begin exploring it today. Inclusionary financial services for low-income and underbanked communities are in such dire need that we are compelled to consider opportunities to provide them.

Tokenized, Programmable Money: A Glimpse at Its Future

The Project's interest in a U.S. CBDC is not just about saving transaction costs, enjoying new conveniences, or the possibility of serving historically underserved segments of our population, as worthwhile as they are. It is also about preserving

---

[6] "2017 FDIC National Survey of Unbanked and Underbanked Households", Federal Deposit Insurance Corporation, October 2018, at: *https://www.fdic.gov/householdsurvey/2017/2017report.pdf*.

[7] Medium.com, "Thinking Big on Fed Accounts, Digital Dollars and Financial Inclusion", June 23, 2020, Chris Brummer, at: *https://medium.com/@chrisbrummer*.

American predominance in the global economy and, as I'll argue a bit later, enshrining democratic values in the future of money.

Throughout recorded history, sovereign and nonsovereign currencies have competed for patronage in global commerce. Many factors enabled some currencies to trade at discounts or premiums to others, especially social trust based on the issuers' economic strength and stability. However, technological superiority often gave advantage to one currency over another, such as China's innovative paper currency in the Eleventh Century or an instrument from which the U.S. currency derives its name: the Spanish Dollar that from the 15th through 18th centuries was easily divisible into "pieces of eight" for greater commercial convenience. [8]

Society is today experimenting in far ranging ways with digital money and assets. As we go into the future, the continuing evolution of the Internet is rendering things of value into tokenized and ultimately programmable digital instruments, from cryptocurrencies like Bitcoin and Ethereum, to innovative "stable coins" and nonfungible digital tokens or "NFTs." We must carefully consider what role the U.S. Dollar will play in this digital future.

As former CFTC Chairman, I am cognizant of the fact that prices for most of the world's key tradable commodities and contracts are today set in America's deep, transparent and well-regulated commodity futures markets. Those prices are set in U.S. dollars. As a result, those global commodities are paid and accounted for in U.S. dollars. This dynamic is an important pillar of the U.S. dollar's primary reserve currency status.

In the not too distant future, contracts for delivery and exchange-traded futures on those U.S. dollar-denominated commodities, contracts, and other significant items of value will be rendered into digitized, tradable tokens and coupled with algorithmically driven smart contracts. The question is: Will the digital commodities and contracts of the future still be priced and accounted for in U.S. dollars if the U.S. currency remains an analog instrument, not digital and programmable? Or, rather, will key global commodities be priced and accounted for in some other currency that is digitized and programmable?

We must face these questions today. It would be foolish to take the Dollar's predominant status in the international financial system for granted. Careful examination of a Digital Dollar is necessary to insure that the United States preserves the leadership role of the U.S. Dollar.

Global Competition for the Future of Money

There is an enormous amount of work being done currently by overseas central banks on central bank digital currency. The Bank for International Settlements reports that almost ninety percent of central banks recently surveyed said they were considering the pros and cons of issuing digital fiat, while three-fifths of central banks are now actively experimenting with CBDC. [9]

China is particularly far along, working on what it calls the Digital Currency Electronic Payment (DCEP) system. A number of large, important Chinese businesses have joined this initiative as partners in implementing the technology. Today, both Chinese citizens and noncitizens can download digital wallets from six major Chinese banks and fund them with Digital Renminbi (or RMB). [10] And, with the wallets they can shop in select stores in Beijing and Shanghai. [11] This is just the beginning for domestic use of Digital RMB.

Yet, domestic use is only one purpose of China's CBDC. Another is to integrate Digital RMB into China's high-priority global infrastructure development strategy, known as "one belt, one road." Such integration could encourage dozens of participating economies to make payments using Digital RMB. Additionally, China could lure developing economies throughout South East Asia and Africa to peg their digital domestic currencies to that of China.

Chinese technological dominance in digital currency systems would pose serious challenges for the U.S. and other democratic societies. If CBDC payment systems can bypass the Western-dominated global, account-based banking system, the

---

[8] Shepard Pond, "The Spanish Dollar: The World's Most Famous Silver Coin", *Bulletin of the Business Historical Society, The President and Fellows of Harvard College*, Vol. 15, No. 1 (Feb., 1941) at: *https://www.jstor.org/stable/i356449.*

[9] Bank for International Settlements (BIS), "Ready, Steady, Go?—Results on the Third BIS Survey on Central Bank Digital Currency", January 27, 2021, Codruta Boar and Andreas Wehrli at: *https://www.bis.org/publ/bppdf/bispap114.pdf.*

[10] SMSH, "Yes, Foreigners Can Use China's New E-CNY Digital Currency: Alipay and WeChat Pay Are so 2020", *Shanghai Life*, May 21, 2021, at: *https://www.smartshanghai.com/articles/activities/how-to-use-china-digital-yuancbdc.*

[11] Id.

United States would lose a powerful policy tool for economic sanctions.[12] In addition, if foreign central banks come to maintain smaller amounts of dollar reserves to fund purchases of a shrinking amount of global commodities priced in dollars demand would decline for U.S. Government bonds. That would result in higher interest rates for both the U.S. Government and American consumers.

Assuring Democratic Values in the Future of Money

The dollar's ascendance during the post-World War II period was accompanied by a historical rarity: the birth of a truly global market for goods and services. That, in turn, helped millions of historically impoverished people lift themselves into the middle class. As a consequence of this ascendancy of the U.S. dollar as a global reserve currency, today more people than ever before in human history enjoy improved health, child welfare, and all the educational and civil liberty benefits that accompany material wherewithal.

This remarkable late 20th century improvement in human well-being is related to the global embrace of democratic ideals of individual liberty, freedom of speech, personal privacy, free enterprise, and the rule of law of democratic societies. These ideals are encoded in the U.S. currency, the Dollar.

Some of those ideals are also set out in U.S. Constitution. One in particular, is the Fourth Amendment's right to privacy. From it stems a rich body of jurisprudence defining the balance between an individual's right to privacy—including financial privacy—and the State's limited ability to abridge that privacy in pursuit of legitimate law enforcement, national defense, or other overriding objectives. Amongst the major democracies—and certainly when compared to autocracies—the United States has some of the most robust constitutional protections against Government infringement of individual financial privacy.

With the proper Fourth Amendment jurisprudence and thoughtful design choices relating to anonymity and individual privacy, the Digital Dollar could well enjoy privacy protections superior to many competing instruments—whether provided by commercial interests or other sovereign nations.

This would especially be true compared to central bank digital currency of anti-democratic regimes that, undoubtedly, will be used as instruments of State surveillance. Highly autocratic Governments will seek to use sovereign digital currency to operate "social credit" systems, by which individuals and businesses will be tracked and evaluated for political trustworthiness. Criticism of an authoritarian regime may one day result in one's digital money being disabled from paying for, say, access to electronic media, transportation outside of one's village, or even necessities like food.

Accordingly, privacy rights may turn out to be an ace the United States can play in the contest over the future of digital money. Encoding traditional American ideals of economic freedom and privacy into a Digital Dollar will surely enhance its global appeal. Hundreds of millions of people in the developing world may well be reluctant to surrender their growing economic security and autonomy to authoritarian State surveillance, simply for the convenience of digital payments. As it has so often in its history, the United States has the opportunity to lead in a way consistent with its finest ideals.

That is why it is so important that advocates for economic privacy be fully engaged and heard as a U.S. CBDC is being analyzed and considered. We must make sure that the values that are enshrined in the Dollar today—values like individual liberty, freedom of speech, personal privacy, free enterprise and the rule of law—are encoded in the Digital Dollar of the future.

Piloting Development of the Digital Dollar

Like it or not, we are entering a new world, a world in which many intangible assets will be rendered as digital tokens recorded on distributed ledgers. It has already begun.

When it comes to sovereign money, the questions are: Who will design and engineer digital currency systems? Who will set the key standards and protocols for interoperability? And what social values will be incorporated into them? If the U.S. dollar is to remain the world's primary reserve currency in this new era, then we must consider whether to evolve it from an analog to a digital currency that effectively measures, supports, and transacts with the world's digitally tokenized things of value.

The Digital Dollar Project believes that well-architected, durable and universal U.S. CBDC, with trusted privacy protections, may well be in the national interest

---

[12] Whatever one's opinion of specific instances or frequency of utilization of economic sanctions, they are certainly less widely destructive than a key alternative of statecraft: warfare.

of the United States and, we believe, in the interest of the world economy. Crafting it will be an enormous and complicated undertaking.

Considering the launch of a Digital Dollar needs to be done carefully, thoughtfully and deliberately. To create something in keeping with the complexity and worth of the U.S. dollar's global importance requires that any such consideration not be conducted in a hurried manner. It will take time and seriousness to get it right.

Nevertheless, now is the time to get started. The recent launch of SpaceX reminds us that the United States explored outer space and the lunar surface through a series of pilot programs known as Mercury, Gemini, and Apollo. So too, should the U.S. explore a Digital Dollar in a series of well-conceived and executed pilot programs.

The Federal Reserve is looking thoughtfully at central bank digital currency. We are encouraged by the strong and positive statements by Chairman Jerome Powell [13] and Governor Lael Brainard [14] on exploring and seeking public input into design of the Digital Dollar. The Federal Reserve Bank of Boston has assembled some fine researchers working with The Massachusetts Institute of Technology's Digital Currency Initiative, whose Director is also giving testimony today. That collaboration is exploring core technological architecture of a U.S. CBDC.

The work of the Digital Dollar Project is intended to complement and not controvert the work of the Federal Reserve, including by Federal Reserve Bank of Boston with MIT. We look forward to the Federal Reserve's upcoming discussion paper and examining its important conclusions.

Yet, notwithstanding the important work of the Federal Reserve, a great deal of exploration still must be done to confirm valuable use cases, understand user behavior and sociological implications, and explore public policy challenges and opportunities of CBDC through broad stakeholder participation and discussions. That is why the Digital Dollar Project recently announced the launch of a neutral, open< and collaborative forum working with the private sector to conduct pilot programs to explore those policy challenges and opportunities. [15] This research platform will serve as a "test ground" for collaboration by a wide range of commercial and noncommercial stakeholders.

The Project seeks broad and even-handed public sector engagement. It will select pilot programs and participating institutions according to criteria approved by the Project's nonpartisan Advisory Group. It will explore, analyze and understand technical and functional requirements, test applications and approaches and consider promising use cases for both retail and wholesale commercial utilization. The pilot programs will be designed with an unbiased and nonprofit perspective that seeks to uncover and present the raw data unencumbered by commercial influence or priorities.

The Digital Dollar Project believes its initiative will help examine three of the key preconditions for a CBDC identified by researchers at the Federal Reserve: broad stakeholder support, robust technology and market readiness. [16] The Project will release the results of the pilots to the public for use in academic study, as well as policy consideration by Congress, the Federal Reserve, the U.S. Treasury, and the wider stakeholder community.

When the U.S. has led the world in technological innovation—whether exploring outer space in the last century or cyberspace at the turn of this century—it has done so through public/private partnerships. [17] In these partnerships, the U.S. Govern-

---

[13] "Federal Reserve Chair Jerome H. Powell Outlines the Federal Reserve's Response to Technological Advances Driving Rapid Change in the Global Payments Landscape", May 20, 2021, at: *https://www.federalreserve.gov/newsevents/pressreleases/other20210520b.htm.*

[14] Lael Brainard, "Private Money and Central Bank Money as Payments Go Digital: An Update on CBDCs", Board of Governors of the Federal Reserve System, May 24, 2021, at: *https://www.federalreserve.gov/newsevents/speech/brainard20210524a.htm.*

[15] "Digital Dollar Project to Launch Pilot Programs to Explore Designs and Uses of a U.S. Central Bank Digital Currency," May 3, 2021, at: *https://newsroom.accenture.com/news/digital-dollar-project-to-launch-pilot-programs-toexplore-designs-and-uses-of-a-us-central-bank-digital-currency.htm.*

[16] Jess Cheng, Angela N. Lawson, and Paul Wong, "Preconditions for a General-Purpose Central Bank Digital Currency", Board of Governors of the Federal Reserve System, Fed Notes, February 24, 2021, at: *https://www.federalreserve.gov/econres/notes/feds-notes/preconditions-for-a-general-purpose-central-bank-digitalcurrency-20210224.htm* identifying the following five broad preconditions: "clear policy objectives, broad stakeholder support, strong legal framework, robust technology, and market readiness."

[17] In the 1960s, NASA partnered with a host of private sector vendors, engineering firms, and contractors to land a man on the moon and accomplish America's then highest priority. Also in the 1960s, the Pentagon's Defense Advanced Research Projects Agency (DARPA) contracted to the private sector development of key Internet components while, later in the century, the

Continued

ment has directed central policy frameworks to further the public interest while the private sector supplied technological innovation large-project management capability and competitive urgency. Without the blending of the two, exploration of the lunar surface and cyberspace may have been delayed beyond the twentieth century into the twenty-first.

It may be argued that developing a dollar CBDC is so important to the national interest that it should be the exclusive work of the public sector and not involve the private sector. We disagree. It is because the development of a dollar CBDC is so important to the national interest that it must involve collaboration by both. Collaboration was the basis for successful exploration of both outer and cyberspace. It is the way America succeeds in doing big technological things. It is the right way to explore the future of money.

This global wave of digital currency innovation is quickly gaining momentum. The challenge for the United States is to play a leadership role and assure that its democratic values are brought to bear. If the U.S. fails to lead this wave of CBDC innovation it must be prepared to accept that the digital future of money will incorporate the values of America's global adversaries.

It is naive to think that the Internet, in its continuing evolution, will not transform money in the same way it has transformed information, social networking, retail shopping, local transportation, travel and leisure, photography, and the music and entertainment industries. For money itself, that transformation has already begun.[18] The pace of innovation will never again be as slow as it is today. It is incumbent upon policymakers to consider modernizing the Dollar for the same reason we must modernize all economic and commercial infrastructure—to keep pace and benefit from advanced, new architectures of technology and innovation. It is about pursuing less friction, less cost, better policy tools and broader social inclusion. It is about exploring new digital monetary architecture alongside its old analog foundation.

We should modernize the Dollar to make sure that the values that are enshrined in the Dollar today—values like freedom of speech, individual economic privacy, free enterprise, and the rule of law—are encoded in the digital future of money.

The time has come to explore the opportunities and challenges of a U.S. CBDC through well-crafted and carefully executed pilot programs conducted in thoughtful partnership between the public and private sectors in the best tradition of American innovation.

The time has come to explore the Digital Dollar.

PREPARED STATEMENT OF LEV MENAND

ACADEMIC FELLOW AND LECTURER IN LAW, COLUMBIA LAW SCHOOL

JUNE 9, 2021

Chair Warren, Ranking Member Kennedy, and Members of the Committee, thank you for the opportunity to testify this afternoon. I am a lecturer in law and academic fellow at Columbia Law School where I research money and banking. My work focuses on the design of monetary systems and the institutional structures that Congress has created to supply the U.S. economy with dollars.

In June of 2018, along with Morgan Ricks and John Crawford, I proposed that Congress authorize the Federal Reserve to offer a retail "central bank digital currency" or CBDC through a program we called "FedAccounts."[1] FedAccounts would be available to any U.S. resident or business in digital wallets operated by the Fed, the Post Office, or one of the country's several thousand community banks. These wallets would charge no fees and have no minimum balances. They would come with debit cards, direct deposit, and bill pay. Their balances would be nondefaultable no matter how large—just like physical cash. They could be exchanged in real time, 24x7x365. They would have customer service, privacy safeguards, and fraud protec-

---

National Science Foundation created NSFNET to contract with both private companies and public universities to lay the groundwork for the Internet as we know it today.

[18] It is estimated that annualized stablecoin trading volume is $16 trillion compared to U.S. wholesale payment volume of $25 trillion. See Caitlin Long, "Ten Stablecoin Predictions and Their Monetary Policy Implications", *Cato Journal*, Spring/Summer 2021, at: *https://www.cato.org/cato-journal/spring/summer-2021/ten-stablecoin-predictionstheir-monetary-policy-implications.*

[1] Morgan Ricks, John Crawford, and Lev Menand, "Central Banking for All: A Public Option for Bank Accounts", *The Great Democracy Initiative*, June 2018. See, also, John Crawford, Lev Menand, Morgan Ricks, "FedAccounts: Digital Dollars", 89 *Geo. Wash. L. Rev.* 113 (2021).

tion—if you lost your password, there would be someone you could call. And they would earn interest at the same rate that the Fed pays to banks.

In the past 3 years, the case for authorizing FedAccounts has only grown. To understand how and why, it helps to review some of the shortcomings with our existing money and payments system.

I. Money and Banking in the United States.

Our economy is built around the U.S. dollar, which the First Congress established as the country's "unit of account" in 1791.[2] The Government creates two types of dollars that are available to the general public: physical dollars and deposit dollars. It creates the first type directly. The U.S. Mint issues dollar denominated coins, and the Federal Reserve issues dollar denominated paper notes. There are $2 trillion of coins and notes outstanding, although most of this cash circulates abroad.[3]

The second type of money, deposits or account money, is the more important type. Deposits are not physically certificated like paper notes. They are ledger entries. Imagine a simple spreadsheet with two columns. Column A is a list of people and legal entities. Column B is a list of numbers. Each entry is a deposit. There are over $17 trillion of deposits like this outstanding today. That is more than ten times the amount of cash in use domestically.[4] Since cash can be lost, stolen, or destroyed, people use deposits to save. And since cash is hard to move around, especially in large amounts, people and institutions also use deposits to conduct transactions. They pay their rent with deposits. They receive their salary in deposits. They settle their credit card bills using deposits. Most businesses depend on deposits to operate.[5]

But, unlike cash, the Government does not issue deposits directly to the general public. It outsources this function to publicly chartered, privately owned banks. And although people treat bank account balances as equivalent to Government-issued cash, banks don't actually hold cash to back them. In fact, they create deposits out of thin air. The way it works is fairly simple: Someone asks to borrow money. The bank agrees and lends deposits by plussing up the borrower's deposit account balance at the bank. In other words, the bank edits Column B in the spreadsheet. All it takes is the stroke of a keyboard.

This system is stable—with people treating their deposit balances as equivalent to cash—only because the Government stands behind deposit balances. The Office of the Comptroller of the Currency, the Federal Reserve, and the Federal Deposit Insurance Corporation (FDIC) are the franchisors: they charter the banks and back them. The banks are the franchisees: They interact with the depositors and create the deposits.[6]

Although we treat deposits like they are all on one big spreadsheet, they're not. Each bank has its own ledger (technically speaking, it issues its own money). When depositors want to make transfers to customers of other banks, the Government enables the transfer using programs called FedWire and FedACH. If depositors want cash instead of deposits, banks can go to the Fed and get cash at a program called the discount window. If a bank makes too many bad loans and fails, the FDIC steps in to ensure that the bank's deposits can still be exchanged for cash. In each case, the Government ensures bank deposits are good money.h

II. Shortcomings in the U.S. Money and Banking System

This system is not working particularly well. Banks are not meeting the needs of our increasingly digital economy. And nonbanks are trying to fill the gaps left by banks with dangerous deposit substitutes.

Consider a few of the biggest problems with the system:

---

[2] 31 U.S.C. §5101 ("United States money is expressed in dollars.").

[3] Bd. of Governors of the Fed. Rsrv. Sys., Monetary Base: Currency in Circulation, Fred: Fed. Rsrv. Bank of St. Louis; J.P. Koning, "How Much U.S. Currency is Held Overseas?", *Bullionstar* (Jul. 3, 2019) (estimating that 60 percent of U.S. banknotes are offshore).

[4] Bd. of Governors of the Fed. Rsrv. Sys., "Deposits, All Commercial Banks", Fred: Fed. Rsrv. Bank of St. Louis.

[5] Paul Samuelson and William D. Nordhaus, *Economics* 228 (13th ed. 1989) ("today is the age of bank money" . . . "[i]f we calculate the total dollar amount of transactions, nine-tenths take place by bank money, the rest by paper money").

[6] To ensure that banks operate in the public interest, Congress has enacted a series of laws to (1) prevent banks from dominating other industries by separating them from private commerce, (2) diffuse their power by spreading them out across the country and preventing any one bank from becoming too large, and (3) hold them in check through rigorous, informal oversight by special Government supervisors. For a discussion of these safeguards and how they have eroded in recent decades, see Lev Menand, "Why Supervise Banks? The Foundations of the American Monetary Settlement", 74 *Vand. L. Rev*. 951 (2021).

- *It leaves a lot of people out*. Over 6 percent of U.S. households do not have access to deposit money at all. Most of them either don't trust banks or don't have enough money to open and maintain an account. That's millions of people stuck on the sidelines, at a significant disadvantage when it comes to getting a job, finding a place to live, or participating in the online economy. [7]
- *It is costly*. Banks, which are organized for profit, charge high fees for using deposit money. Most accounts have minimum balance requirements and monthly account maintenance fees. They often charge substantial amounts for checks and wires. Estimates of annual bank overdraft fees, another way banks extract rents from their privileged position, run into the tens of billions. Banks also earn large amounts through interchange fees that are imposed on card-based payments—a huge cost for small businesses and consumers. [8]
- *It is slow*. Checks drawn on deposit accounts take up to 2 days to clear. Even wire transfers do not settle until the end of the day and credit card payments may not settle for up to 2 days. A bank account transfer made before Memorial Day Weekend on Friday May 28, for example, likely did not clear until Tuesday, June 1. Five days to edit a couple of cells in a spreadsheet is far too long in a world where billions of people can communicate near-instantly using mobile devices. [9]
- *It is complex*. With thousands of banks operating different ledgers, it takes a lot of work by the Fed and the banks to ensure that transactions between the different ledgers clear.

These are all first order problems with the Government's existing monetary offerings. There is also an urgent second-order problem: a range of unstable private sector alternatives. These alternatives are basically monetary ledgers maintained by nonbank financial institutions. In the short run, these ledgers might operate faster and more efficiently; in the long run, they undermine financial stability, threaten to trigger severe recessions, weaken the U.S. internationally, and fuel ransomware attacks, money laundering, and tax evasion.

One group of workarounds—eurodollars, repos, commercial paper, and money market mutual funds—has been around for several decades. These deposit substitutes brought down the U.S. economy in 2008. They are issued by firms that operate like banks but lack a charter from the Government to issue deposits (shadow banks). Most Americans are unfamiliar with these deposit substitutes because they are used primarily by businesses, institutional investors, high-net worth individuals, and financial companies. Nevertheless, these instruments compete with deposits to satisfy money demand: they offer better security (deposit insurance maxes out at $250,000) or better returns (banks don't pay a lot of interest to their depositors). But they are highly unstable: their issuers do not have access to the Fed's discount window and in the face of economic uncertainty the people who hold them often decide all at once to switch back to deposits, unleashing chaos in financial markets. [10]

Although eurodollars, repos, commercial paper, and money funds remain a serious problem—they triggered another financial crisis in 2020, which the Fed quelled by launching an unprecedented round of backstopping [11]—now another, equally dangerous breed of deposit substitute is spreading. These are deposit substitutes marketed at a retail level to ordinary households and businesses.

The new retail deposit substitutes come in many shapes and sizes. One type aims to displace the dollar entirely. The most prominent of these are cryptocurrencies called Bitcoin and Ethereum. They do not have a central issuer (like bank deposits) but operate using distributed ledger technology: each currency user has a copy of the entire spreadsheet. These deposit substitutes offer users the ability to make anonymous transfers across national boundaries in a matter of minutes instead of

---

[7] See Mehrsa Baradaran, "How the Other Half Banks: Exclusion, Exploitation, and the Threat to Democracy" (2015); Mehrsa Baradaran, "How the Poor Got Cut Out of Banking", 62 *Emory L. J.* 483 (2013); Michael Barr, "No Slack: The Financial Lives of Low-Income Americans" (2012).

[8] See Aaron Klein, "A Few Small Banks Have Become Overdraft Giants", Brookings Inst. (Mar. 1, 2021).

[9] See Aaron Klein, "The Fastest Way To Address Income Inequality? Implement a Real Time Payment System", Brookings Inst. (Jan. 2, 2019). This problem was particularly severe during the COVID–19 pandemic: It took between 3 weeks and 3 months for the Government to distribute stimulus payments. See Aaron Klein, "70 Million People Can't Afford To Wait for Their Stimulus Funds To Come in a Paper Check", Brookings Inst. (Mar. 31, 2020).

[10] See Morgan Ricks, "The Money Problem: Rethinking Financial Regulation" (2016).

[11] See Lev Menand, "The Federal Reserve and the 2020 Economic and Financial Crisis", 26 *Stan. J. of L., Bus. & Fin.* (2021).

hours or days. Although they are unlikely to ever displace dollar money instruments fully, as their use grows, so do the harms they threaten.

For example, if more transactions are denominated in cryptocurrencies, it will be more difficult for the Fed to stimulate economic activity through monetary policy. The use of multiple currencies in the same economy will also increase transaction costs and incentivize arbitrage. (There is a reason why the Japanese Yen, despite being a stable currency, is not used in Los Angeles.) In addition, widespread use of cryptocurrencies may hamper price discovery. People in the U.S. value goods and services and tangible and intangible property in dollars and use vast stores of information about how much things are worth in dollars to order their economic lives. New units of account are unmoored by comparison.

Perhaps even worse, cryptocurrencies divert limited social resources (including energy[12] and the technical skills of thousands of computer scientists and entrepreneurs) away from more productive endeavors. And they offer malicious actors a way to bypass U.S. money laundering and tax laws. Hackers use them to extort U.S. companies.[13] Foreign adversaries use them to attack American hospitals and Government agencies and to finance nuclear missile programs.[14]

Another new type of retail deposit substitute is more familiar. It is denominated in dollars. The best-known example is Venmo, which is a money issued by the financial technology firm PayPal. Venmo is growing rapidly, and now has over $30 billion of balances. The cryptocurrency version of this substitute is called a stablecoin and uses distributed-ledger technology. The most prominent stablecoins are Tether and USD Coin, with over $80 billion in balances between them.

Stablecoins and Venmo balances are economically equivalent to deposits—they are dollar denominated ledger entries—but they are not issued by chartered banks and are not backed by the FDIC. In other words, their issuers are shadow banks, among the biggest in the United States. They don't have access to the Fed's discount window. And they are highly susceptible to runs and panics. If Congress does not act soon to address the risks posed by Venmo, stablecoins, and cryptocurrencies, they may ultimately trigger a financial calamity and recession worse than 2008.[15]

III. How CBDC Could Help

A CBDC like FedAccount cannot solve all of the first and second order problems with our money and banking system. But it can help in a variety of ways. For example:

- It can bring millions of people into the mainstream financial system. The primary reason six percent of households lack bank accounts is that it is unprofitable for banks to operate deposit accounts for people with low balances.[16] FedAccounts would make digital dollars available regardless of the balance and the Fed would ensure that anyone who is eligible could open an account regardless of cost.
- It can speed up payments. FedAccount payments would clear immediately for in-network users.
- It can reduce the fees banks and other financial institutions charge their customers. FedAccounts would charge no fees.
- It can bolster financial stability. FedAccounts would offer many businesses and other institutions what they are looking for when they pile into deposit substitutes: riskless money with a positive yield. A bigger supply of such money will crowd out some of the bad money that has been proliferating in recent years. By offering people a safe and effective form of digital cash, they will be less likely to turn to stablecoins and other unstable financial technology products.

---

[12] Cambridge Bitcoin Electricity Consumption Index, University of Cambridge (last accessed Jun. 6, 2021) (estimating that Bitcoin's decentralized ledger technology consumes 115 Terawatts of electricity per year, more than countries like the Netherlands and the Philippines, accounting for over 0.5 percent of worldwide electricity consumption).

[13] David Uberti and James Rundle, "U.S. Looks Into Cryptocurrency's Role in Ransomware Hacks", *Wall St. J.* (Jun. 3, 2021).

[14] See Lev Menand, "Regulate Virtual Currencies as Currency", *Just Money* (Feb. 14, 2020).

[15] See Jamie McAndrews and Lev Menand, "Shadow Digital Money" (Apr. 8, 2020); Dan Awrey, Lev Menand, and Jamie McAndrews, "Comment Letter to the Office of the Comptroller of the Currency Warning of the Dangers Posed by the Shadow Payment System and Shadow Digital Money" (July 31, 2020).

[16] See Aaron Klein, "America's Poor Subsidize Wealthier Consumers in a Vicious Income Inequality Cycle", Brookings Inst. (Feb. 6, 2018) ("It can cost banks between $250 and $400 to establish a new checking account and another several hundred dollars a year to maintain it.").

- It can reduce regulatory complexity. Many rules promulgated since the 2008 financial crisis are directly or indirectly targeted at deposit substitutes. By crowding out these instruments, FedAccounts would reduce the need for these regulations. FedAccounts could also potentially reduce the size of the largest U.S. financial institutions. To the extent that these firms, due to their size and wide range of activities, are hard to supervise or enjoy subsidies because of a perception they are "too big to fail," FedAccounts could bring them more in line with other large regional banks and reduce their systemic importance.
- It can improve monetary policy transmission. Since 2008, the Fed has paid interest to banks as part of its standard monetary policy framework. These payments are called interest on reserves or IOR. In theory, IOR "passes through" to everyone, allowing the Fed to influence macroeconomic conditions. But pass through has been lackluster in practice. Banks do not increase the rates they pay depositors in parallel.[17] FedAccounts would mitigate this problem by paying people IOR on their FedAccount balances.
- It can generate revenue for the Government. The returns on the Fed's asset portfolio typically exceed its interest payments and other expenses by a wide margin. These earnings, known as "seigniorage," represent the fiscal revenue from money creation. If a robust CBDC expanded the Fed's balance sheet, remittances to the United States. Treasury could increase substantially, even after accounting for the costs of operating the new program. By recapturing seigniorage, FedAccounts would remove existing distortions in financial markets and reduce rent extraction.
- It can protect national security. The growth of cryptocurrencies, which are increasingly demanded as payment in ransomware attacks on American companies, is driven at least in part by a perception that the U.S. dollar is difficult to use. Accordingly, a faster, safer U.S. dollar money instrument will likely blunt demand for these alternatives.

Some people argue that a CBDC, especially one with robust customer protections and privacy safeguards that also offers interest, would threaten the banking system. This need not and should not be the case. To the contrary, a well-designed FedAccounts program can strengthen the banking system and protect it from growing threats posed by unstable and unregulated deposit substitutes. For example, the Fed might contract with banks to provide retail services as its agents. The Fed could also hire banks to do compliance. Moreover, Congress can direct the Fed to pass back to banks any lost deposit funding with special discount window loans. In this way banks can continue to serve as the Government's franchisees for lending, while simplifying the overall monetary architecture and improving the usefulness of account money.

IV. Conclusion

Money is basic infrastructure. It is the backbone of the economy and a core public good.[18] Unfortunately, our monetary system is antiquated and decaying. If the Government allows it to become even more private, dominated by cryptocurrencies, deposit substitutes, and foreign fiat money, we are bound to face worse financial crises and economic contractions. A CBDC like FedAccounts can be part of the solution. By improving the Government's existing money offerings, it can help strengthen our financial system and our economy.

PREPARED STATEMENT OF DARRELL DUFFIE

ADAMS DISTINGUISHED PROFESSOR OF MANAGEMENT AND PROFESSOR OF FINANCE,
STANFORD UNIVERSITY GRADUATE SCHOOL OF BUSINESS

JUNE 9, 2021

Chair Warren, Ranking Member Kennedy, and other distinguished Members of the Subcommittee, thank you for the opportunity to provide input to your analysis of U.S. strategy regarding a central bank digital currency (CBDC).

The United States should begin the development of an effective and secure digital dollar, a direct obligation of the Federal Reserve that could be distributed to the

---

[17] Morgan Ricks, "Money as Infrastructure", 2018 *Colum. Bus. L. Rev.* 757 (2018).

[1] See Christine Desan, "Making Money: Coins, Currency, and the Coming of Capitalism" (2014). This point is even conceded by some libertarians. See, e.g., Milton Friedman, "A Program for Monetary Stability" 8 (1960) (arguing that money provision is "an essential governmental function on a par with the provision of a stable legal framework").

public at large by regulated private-sector payment service providers. While developing a digital dollar, the relevant U.S. agencies should also attempt to trigger major improvements in the conventional U.S. payment system. Perhaps it will ultimately not be necessary for the Fed to deploy a digital dollar. Maintaining cybersecurity and privacy while controlling illegal payments is a challenging design problem for an effective CBDC-based payment system. Without thoughtful engagement of the private sector, a centralized payment system could also impair innovation. Nevertheless, it seems likely to me that a U.S. digital dollar will ultimately be deployed. A major effort to get the design right should begin now.

The development of an effective and secure digital dollar will require significant resources and time, perhaps more than five years. The development process itself will lead to a much deeper appreciation of the costs and benefits of ultimately deploying a CBDC and could generate large beneficial technology spillovers into other parts of our new digital economy. Further, the development of a viable CBDC may spur firms that currently provide bank-railed payment services to compete more aggressively, in terms of both pricing and technology innovation.

Success will call for unleashing the innovative power of the private sector while increasing the reach and quality of Government regulation. This approach can protect the safety and soundness of payments while advancing U.S. productivity with next-generation digital technology.

As noted last month by Federal Reserve Governor Lael Brainard,[1] the United States should also position itself with a seat at the table of international discussions regarding standards for the design and appropriate uses of CBDCs. The ability of the United States to maintain its leadership in global discussions and in international payment-related markets will rest in part on the knowledge and credibility associated with having developed state-of-the-art CBDC technology to a fully deployable level.

The U.S. should also prepare a strategy for deflecting undesirable and invasive types of cryptocurrencies as they gain traction in U.S. payments. A digital dollar can play a role here by providing an attractive and officially supported alternative.

I am guessing that Dr. Narula will update you today about CBDC research progress with "Project Hamilton" work by the MIT Digital Currency Initiative and the Federal Reserve Bank of Boston.[2] This is the "R" part of "R&D." The transition from research to development implies a significant additional commitment of resources and a plan for building an effective digital dollar. There are many open design options. In particular, who has access to which personal data and who has responsibility for monitoring the legality of payment transactions must be decided in a way that assures Americans of their privacy while protecting them from corrupt payments. Under this constraint, achieving a high degree of efficiency is not a simple matter.

I very much look forward to the release this summer of the Fed's discussion paper on the benefits and risks of CBDCs (Powell, 2021).

Why Can't Banks Do This?

U.S. banks are capable of providing an effective low-cost payment system but have not done so. Regulations, network effects that limit entry, and profit incentives have not promoted an open, innovative, and competitive market.

Even centuries ago, Alice could pay Bob by asking her bank to debit her deposit account in favor of Bob's account at his bank. Today, banks handle the vast majority of payments, whether domestic or cross border, by this straightforward method. U.S. banks take reasonable care to protect the privacy of their customers while monitoring payments for their legality. Commercial bank deposits can be provided in interoperable forms suitable for smart contracting. An advanced interoperable payment system based on bank deposits is feasible but not currently under development, to my knowledge.

Calls for alternatives such as fintech payment firms, private stablecoins like Diem,[3] and CBDCs, have been incited by the low efficiency and high cost of the current bank-railed payment system. Many Americans are wondering, "If China has such an advanced low-cost retail payment system, then why can't we?"

It takes too long for U.S. merchants to receive their payments, often more than a day. Based on McKinsey data, moreover, Americans pay about 2.3 percent of GDP for payment services, far more than Europeans, particularly because of extremely high fees for credit cards, as illustrated in Figure 1. This is not because Americans are getting better quality service. Further, the primary payment instrument of

[1] See Brainard (2021).
[2] See Rosengren (2021).
[3] See Catalini (2021).

Americans, their bank deposits, is compensated with extremely low interest rates. When wholesale market interest rates rise, consumer bank deposit interest rates remain much lower, typically near zero. [4]

U.S. banks and credit card providers operate what Rochet and Tirole (2003) call a two-sided market. On one side of the market, merchants pay high payment fees. On the other, consumers are offered low direct payment fees, and sometimes rewards. This approach, combined with the positive network effects of a common payment system that is convenient for consumers to use, binds all market participants to the bank-railed system. So far, competitive entry into this market has been difficult.

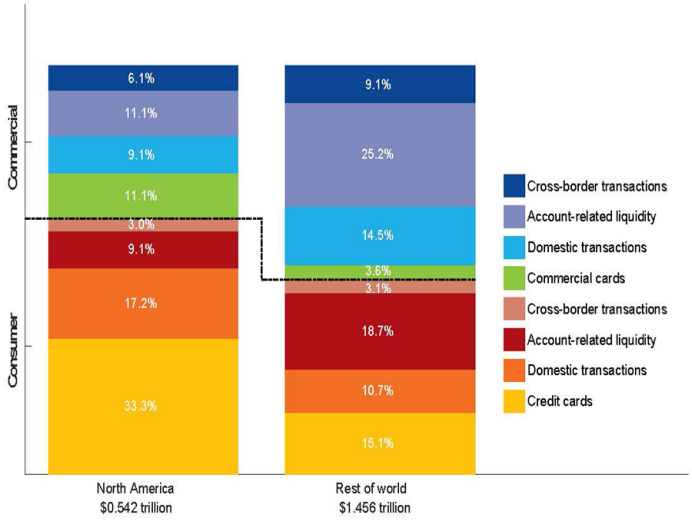


Figure 1. A breakdown of payment revenues by type. Data source: McKinsey (2021).

Ultimately, consumers bear some of the burden of merchants' payment fees through higher prices for goods and services. In order to make their payments, moreover, many consumers borrow money at high interest rates on their card accounts or store the cash that they will use to make payments in bank accounts that offer woefully low interest rates. It's not easy for many Americans to shop aggressively for deposit and payment services. Banks have "walled gardens"—with little to gain by making it simple for their customers to move their cash to the highest bidder.

Banks have also underinvested in payment technologies that would improve the speed, interoperability, and programmability of payments. The Fed has had to step in with the development of its own real-time payment system, FedNow, which will be ready in a few years. FedNow will improve the speed of payments and offer other efficiency gains but brings no assurance of significantly improved competition for payment services. For this reason and for the other reasons that I have outlined, I believe that it is time for Congress to give the Fed the legal power to introduce a digital dollar and to encourage or direct the Fed to develop and field-test an effective digital-dollar technology to the point at which it could be deployed on reasonably short notice. There is no need to decide now to deploy the digital dollar. We will learn a lot more about the associated costs and benefits before digital-dollar technology is ready to use. Moreover, common knowledge that a digital dollar could be deployed might encourage banks to offer Americans a better payment system.

[4] See, for example, Driscoll and Judson (2013), Drechsler, Savov, and Schnabl (2017), and FDIC historical data.

Under current regulations and market structure, banks simply do not have sufficient incentives for this.

Congress could also direct the U.S. Treasury to update Congress regularly on the latest developments and its thinking on ways to advance the U.S. payment system, including CBDC technology.

Surely many banks realize that their profitable stewardship of the payment system will eventually be taken away from them unless they offer a better deal to their customers. Low-cost fintech payment firms, especially if given Fed accounts, might grab bank payment franchises. This happened in China, where 94 percent of mobile payments are now processed by Alipay and WeChatPay, with 90 percent of residents of China's largest cities using these services as their primary method of payment.[5] Or, stablecoins like Diem might disintermediate banks. Or, here in Congress, you could ask the Fed to introduce a digital dollar. Banks have not yet aggressively taken up the challenge to offer better and cheaper payment services because the technology upgrade is costly and because the first banks to offer a truly open and competitive service may cede significant profits. Some banks may also believe that Congress will not act aggressively in this arena. Congress can help to correct a market failure by opening a path by which consumers and businesses can get access to better options, such as a CBDC or other new types of fintech payment services. If incumbent banks do not respond, then one or more of these options should be deployed.

A further impetus for a digital dollar is financial inclusion. A 2020 study by the Federal Deposit Insurance Corporation estimates that about 7.1 million U.S. households are unbanked. Many additional households are underbanked. As noted by Treasury Secretary Janet Yellen,[6] a digital dollar could improve the access of unbanked Americans to basic payment services. The use of paper money in U.S. payments declined from 51 percent in 2010 to an estimated 28 percent in 2020 (McKinsey, 2020). If the acceptability of paper currency declines sufficiently, those without access to electronic payments would be further isolated from parts of the economy. Ironically, a CBDC could accelerate a decline in the use of paper currency, implying that special attention should be given to unbanked and underbanked Americans, whether or not a digital dollar is deployed.

CBDC technology also offers options for more efficient implementation of fiscal and monetary policy. For example, the COVID–19 pandemic revealed the big difference that a digital dollar could make for the speed of dissemination of Government relief payments to millions of Americans.[7] With CBDC, it may also be possible for the Fed to improve the transmission of monetary policy into the macroeconomy by exploiting digital-currency technology, real-time measurement of monetary variables, and perhaps use the option to offer interest on CBDC.

Challenges for a CBDC

There are also challenges for a potential CBDC to overcome.

The greatest challenge for CBDC designers is protecting the privacy of transactions while at the same time effectively monitoring payments for their legality, particularly with respect to money laundering and financing terrorism. If these responsibilities are absorbed by a central regulator, vast data repositories will need to be protected from cyberattacks and undue surveillance. While new cryptographic technologies can address these concerns, centralized databases containing personal information may not be popular in the United States. China has not hesitated to concentrate CBDC payment data in the hands of its central bank, but China is an authoritarian State.

As one possible approach, the designers of a digital dollar could consider including design features that would allow consumers, perhaps at their option, to access the payment system with standardized biometric identities.[8]

The U.S. could opt for a decentralized approach to holding and monitoring CBDC personal identity and payment data at the level of payment service providers such as banks and fintech firms (Digital Dollar Foundation and Accenture, 2021). This includes a risk that the resulting two-tiered market structure might come to resemble the current bank-railed system. To manage against a similarly inefficient outcome, payment service providers should be tightly regulated for open access, service

---

[5] See Klein (2020) and "Alipay Retains Leadership Position With 55 Percent Market Share in China's Mobile Payments Market", *Business Today*, July 9, 2020.

[6] In a February 22, 2021, *New York Times* DealBook video interview Secretary Yellen said: "Too many Americans don't have access to easy payments systems and banking accounts, and I think this is something that a digital dollar, a central bank digital currency, could help with."

[7] See Digital Dollar Foundation and Accenture (2020), p. 7.

[8] D'Silva, Filkova, Packer, and Tiwari (2019) summarize lessons learned from India's UPI interoperable payment interface.

levels, and interoperability[9] standards. One might then ask: "Why can't the existing bank-railed payment system be similarly regulated so as to achieve a roughly similar beneficial effect?" This question has not yet been answered satisfactorily.

Another potential downside of a CBDC is that technology innovation could become more centralized within Government agencies. This is not usually a formula for success, especially in consumer-facing businesses. I am optimistic, though, that this concern can be overcome with carefully designed public–private partnerships.

A further worry is that if the Fed were to make an unlucky misstep with its CBDC design or if its CBDC has an operational accident, many millions of Americans could be adversely affected. Because the Fed is ultimately answerable to Congress, this could impinge on the Fed's independence as a central bank. The digital dollar should not be deployed for broad public use until the technology is "bullet proof," within the limits of the latest technology. This raises the importance of giving the Fed a green light to begin work now.

I do not expect that the impact of a CBDC on the risk of bank runs will be a major disadvantage of a digital dollar. Bank runs are already a concern without a CBDC. For this reason, banks have substantial regulatory liquidity requirements and are able to pledge their assets to the Fed in exchange for temporary cash loans that can be used to meet deposit redemptions. Access to a CBDC could make it easier to quickly withdraw deposits from a bank. That risk should be carefully analyzed and managed, but I do not expect that it will rule out a CBDC.

The greater mobility of money associated with a CBDC would force banks to compete more aggressively for deposits, driving up deposit interest rates. This would be good for consumers but not for bank shareholders. With this, I do not expect that the amount of credit offered by banks would suffer significantly. Banks do not currently offer unprofitable loans using the irrational justification that they can recoup the associated losses by exploiting their below-market deposit rates. For given macroeconomic conditions, the set of loans that are profitable for banks to offer would probably remain about the same. In any case, the U.S. Government should not allow an inefficient payment system to persist so that depositors can subsidize banks.[10]

In short, I don't believe that the potential for disrupting banks, while real, should be viewed as a major reason for avoiding CBDCs. The banking industry is likely aware that disruption is coming, one way or another, and should prepare to offer Americans a better payment system.

International Implications

Much has been written about the potential impact of eCNY, China's new CBDC, on the international dominance of the U.S. dollar. Concerns that the renminbi will rival the dollar in international markets are not warranted at this time, and these concerns are not a good reason to rush out a digital dollar before it is carefully designed. The international dominance of the U.S. dollar rests on the relative lack of U.S. barriers to cross-border capital flows, the depth and liquidity of globally accessible markets for U.S. Treasuries and other U.S. financial instruments, reliance by global financial market participants on the fairness and stability of the U.S. legal system, and the reliability of U.S. monetary and financial policy.[11] The collective effect of these and other strengths of the U.S. system will not be easy for China to replicate within a significant period of time.

That said, China has taken a big lead over the U.S. in retail payment technology. Domestically, China's mobile payment service providers are technically advanced and have extremely deep market penetration. Limiting the dominance of these private payment service providers was one of the key motivations of China for introducing eCNY.

It's already apparent that eCNY will be part of a rich payment ecosystem supporting a wide range of access methods and use cases. Although representatives of the People's Bank of China have emphasized that eCNY is not intended for "yuanization" of the economies of other countries,[12] China is making arrange-

---

[9] Regarding the critical importance of maintaining interoperability, see Darko, Duffie, and Mathieson (2021).

[10] It should be alerted that I am a member of the board of directors of TNB Inc., which wishes to offer narrow-bank deposits but has been unable to obtain a deposit account at the Fed. TNB's charter prevents it from offering payment-related products and services. I am not compensated by TNB, whether with equity or otherwise.

[11] For these and other sources of support for the dominance of the U.S. dollar, see, among other research Gopinath and Stein (2021), Gourinchas (2019), Jiang, Krishnamurthy, and Lustig (2020), and Maggiori, Neiman, and Schreger (2021).

[12] See Bloomberg News (2021), Zhou (2021), and Sun and Yan (2021), who quote Peoples Bank of China Deputy Governor Li Bo as saying (in an unofficial translation) "The internationalization of the RMB is a natural process. Our goal is not to replace the U.S. dollar or other cur-

ments [13] for cross-border use of eCNY with other CBDCs, including those of Thailand, Hong Kong, and the United Arab Emirates. There are also potentially important business-to-business cross-border applications of eCNY (Ekberg and Ho, 2021).

eCNY technology will likely open commercial opportunities for China in some emerging-market economies. This will increase China's influence in EM countries, which U.S. foreign policy experts may wish to consider carefully. It may advantage the U.S. to have its own CBDC technology to offer to countries that wish to lower the costs or advance the development time for introducing their own CBDCs. Especially for small open economies, the threat of an invasive digital currency can be mitigated by the early adoption of an effective domestic CBDC. For the same reason, the United States should be cautious about the impact that a digital dollar could have on small open economies through its potential for interference with local monetary policy. The United States should support the development of international agreements that would set standards of care for protecting foreign monetary systems from disruption by another country's CBDC.

If the United States becomes an active developer of CBDC technology using public–private partnerships, there would probably be increased opportunities for U.S. firms to benefit commercially in the provision of payment technologies in international markets. U.S. banks have been ceding commercial advantage to Chinese banks in international markets, in part because of U.S. regulations and sanctions. The tradeoffs here should be carefully weighed by the U.S. official sector, case by case.

As I have said, citing Governor Brainard's remarks, the U.S. should prioritize the development of its CBDC technology for reasons that include influence in international forums setting technical standards and intergovernmental agreements for the cross-border use of CBDCs. Such agreements are already coming into G7 discussions. [14]

A majority of the world's central banks are now working on CBDCs (Boar and Wehrli, 2021). While few central banks have specific plans to issue CBDCs, some have moved from research to active development. Active CBDC developers include the Peoples Bank of China, The Central Bank of Sweden (Sveriges Riksbank), [15] the Bank of Canada, [16] the European Central Bank, [17] the Bank of Korea, [18] and the Bank of Japan. [19] Among major economies, only China has committed to deploying a CBDC.

Conclusions

The United States should now begin a significant program for the development of a digital dollar. The design should prioritize the efficiency of payments, privacy, interoperability, financial inclusion, and the ability to monitor payments for compliance. Even a well-resourced development program can be expected to take a number

---

rencies, but to let the market make choices to further facilitate international trade and investment."

[13] See Hong Kong Monetary Authority (2021).

[14] See the G7 Finance Ministers and Central Bank Governors Communique of June 5, 2021. See also Auer, Haene, and Holden (2021), and Associated Press (2021).

[15] See Sveriges Riksbank (2021).

[16] Bank of Canada (2021) states: "The Bank currently has no plans to launch a CBDC. Rather, as a contingency plan only, the Bank will build the capacity to issue a retail, cash-like CBDC should the need to implement one ever arise. Two scenarios have been identified in which launching a CBDC could enable the Bank of Canada to fulfill its mandate. Either scenario could materialize very quickly, warranting vigilant attention to evolving developments in payments. Because of this and given the time required to create a viable CBDC, the Bank has decided to pursue a contingency strategy designed to create a State of sufficient policy and operational readiness to launch a CBDC relatively quickly should that decision be made."

[17] The European Central Bank (2021) states: "We have not yet decided whether to issue a digital euro. We are currently in a preparation phase: we are developing the concept, conducting practical experimentation, listening to the views of the broader public and engaging with stakeholders. We will decide whether to launch a digital euro project towards the middle of 2021, in order to be prepared for the possible issuance of a digital euro at some point in the future."

[18] See reporting by Cynthia Kim of Reuters, "South Korea's Central Bank Moves To Develop Pilot Digital Currency", May 23, 2021.

[19] The Bank of Japan (2021) states: "The Bank of Japan has been undertaking preparations to begin experiments on Central Bank Digital Currency (CBDC) in early fiscal year 2021, to test the technical feasibility of the core functions and features required for CBDC. As necessary preparations are now complete, Proof of Concept (PoC) Phase 1 begins today. In PoC Phase 1, the Bank plans to develop a test environment for the CBDC system and conduct experiments on the basic functions that are core to CBDC as a payment instrument such as issuance, distribution, and redemption. This phase will be carried out through March 2022, for a duration of one year."

of years to achieve a successful design. The final decision to deploy the digital dollar can be delayed until more is learned.

In parallel with the development of a digital dollar, efforts should continue to be made to improve the competitiveness and efficiency of the legacy U.S. payment system. FedNow is an important milestone in that effort. Regulations can be changed to further encourage innovation and competition for payment-related services. The Fed, for example, has recently considered offering accounts to "novel" payment firms under appropriate conditions. [20]

The U.S. should take a leadership position in international official discussions of CBDCs, particularly with respect to the cross-border use of CBDCs.

References

Associated Press (2021) "Japan Wants G7 Finance Chiefs To 'Thrash Out' Digital Currency Policy at Talks as China Trials Continue", *South China Morning Post*, February 9.

Auer, Ralph, Phillipp Haene, and Henry Holden (2021) "Multi-CBDC Arrangements and the Future of Cross-Border Payments", Working Paper, BIS Papers, No 115.

Bank of Canada (2021) "Contingency Planning for a Central Bank Digital Currency", Bank of Canada, February.

Bank of England (2021) "New Forms of Digital Money", Discussion Paper, Bank of England, June.

Bank of Japan (2021) "Commencement of Central Bank Digital Currency Experiments", Press release, Bank of Japan, April.

Bloomberg News (2021) "China Says It Has No Desire To Replace Dollar With Digital Yuan", Online News Article. April 18.

Board of Governors of the Federal Reserve System (2021) "Proposed Guidelines for Evaluating Account and Services Requests", Federal Reserve Board, May.

Boar, Codruta, and Andreas Wehrli (2021) "Ready, Steady, Go?—Results of the Third BIS Survey on Central Bank Digital Currency", Working Paper Number 114, Bank for International Settlements, January.

Brainard, Lael (2021) "Private Money and Central Bank Money as Payments Go Digital: An Update on CBDCs", Speech At the Consensus by CoinDesk 2021 Conference, Washington, DC, Federal Reserve Board, May.

Catalini, Christian (2021) "From Cryptocurrencies, Stablecoins and Diem to CBDCs", Diem, OMFIF conference, May.

Digital Dollar Foundation and Accenture (2020) "The Digital Dollar Project: Exploring a U.S. CBDC", Digital Dollar Project, May.

Drechsler, Itamar, Alexi Savov, and Philipp Schnabl (2017) "The Deposits Channel of Monetary Policy", *The Quarterly Journal of Economics*, Volume 132, Pp. 1819–1876.

D'Silva, Derryl, Zuzana Filkova, Frank Packer, and Siddharth Tiwari (2019) "The Design of Digital Financial Infrastructure: Lessons From India", BIS Paper Number 106, Monetary and Economic Department, Bank for International Settlement, December.

Duffie, Darrell, Kelly Mathieson, and Darko Pilav (2021) "Central Bank Digital Currency: Principles for Technical Implementation", Digital Asset White Paper, April.

Driscoll, John, and Ruth Judson (2013) "Sticky Deposit Rates", Working paper, Finance and Economics Discussion Series Divisions of Research & Statistics and Monetary Affairs, Federal Reserve Board, Washington, DC, October.

Ekberg, Jason, and Michael Ho (2021) "A New Dawn for Digital Currency", Report, Oliver Wyman, May.

European Central Bank (2021) "A Digital Euro", European Central Bank.

Federal Deposit Insurance Corporation (2020) "How America Banks: Household Use of Banking and Financial Services", FDIC, Washington, October.

G7 Finance Ministers and Central Bank Governors (2021) "Communique", June 5, 2021.

Gopinath, Gita, and Jeremy Stein (2021) "Banking, Trade, and the Making of a Dominant Currency", *The Quarterly Journal of Economics*, Volume 136, pp. 783–830.

[20] See Board of Governors of the Federal Reserve System (2021). In its associated press release, the Board quoted Federal Reserve Governor Lael Brainard, who said "With technology driving rapid change in the payments landscape, the proposed Account Access Guidelines would ensure requests for access to the Federal Reserve payments system from novel institutions are evaluated in a consistent and transparent manner that promotes a safe, efficient, inclusive, and innovative payment system, consumer protection, and the safety and soundness of the banking system."

Gourinchas, Pierre-Olivier (2019) "The Dollar Hegemon: Evidence and Implications for Policy Makers", Presentation at the 6th Asian Monetary Policy Forum, Singapore, May 2019.
Group of 30 (2020) "Digital Currencies and Stablecoins: Risks, Opportunities, and Challenges Ahead", Working Group on Digital Currencies, Group of 30, Washington, DC, July.
Hong Kong Monetary Authority (2021) "Joint Statement on Multiple Central Bank Digital Currency (m-CBDC) Bridge Project", The Government of Hong Kong Special Administrative Region, February.
Jiang, Zhengyang, Arvind Krishnamurthy, and Hanno Lustig (2020) "Dollar Safety and the Global Financial Cycle", NBER Working Paper 27682, August.
Klein, Aaron (2020) "China's Digital Payment Revolution", Brookings Global China Discussion paper, April, 2020.
Maggiori, Matteo, Brent Neiman, and Jesse Schreger (2021) "International Currencies and Capital Allocation", *Journal of Political Economy*, Volume 128, pp. 2019–2066.
McKinsey and Company (2020) "The 2020 McKinsey Global Payments Report", McKinsey, October.
Powell, Jerome (2021) "Message on Developments in the U.S. Payments System", Federal Reserve Board, May 20.
Sveriges Riksbank (2021) "E-Krona Pilot: Phase 1", Sveriges Riksbank, April.
Rochet, Jean-Charles, and Jean Tirole (2003) "Platform Competition in Two-sided Markets", *Journal of the European Economic Association*, Volume 1, pp. 990–1029.
Rosengren, Eric (2021) "Remarks at the Panel Discussion, 'Central Bank Perspectives on Central Bank Digital Currencies'", Program on International Financial Systems, Harvard Law School, May.
Sun L. and Pan, Y. (2021) "Central Bank: The Current Development Focus of the Digital RMB Is To Promote Domestic Use", *China Finance*, sina.com, April 19 (in Chinese).
Zhou, Xiaochuan (2021) "China's Choices in Developing Its Digital Currency System", Caixin, February 20.

RESPONSES TO WRITTEN QUESTIONS OF SENATOR CORTEZ MASTO FROM NEHA NARULA

Q.1. *Distribution of Federal and State Benefits*—Could digital currency improve access to Federal benefits for people who lack access to a local financial institution or affordable ATM? If so, how?

A.1. In theory, a digital currency could help improve access to Federal benefits for people who lack access to bank accounts or ATMs. However, doing so safely, securely and effectively would require implementing a fair amount of financial infrastructure and educational material surrounding the digital currency first. For example, users would need to be educated about digital currency and be convinced of its safety and security, or they might simply choose not to use it. The Federal Government would need a way of tying an internal Federal benefits identifier to the recipient's digital wallet to administer the funds; this information would have to be collected and maintained. The digital currency would need to be widely accepted by merchants in the recipient's community, or, the recipient would need a convenient way of converting the digital currency into cash or an electronic form that is widely accepted, like a prepaid card or mobile payment application account. The recipient would need to be familiar with the software used to interact with the digital currency, and if it requires a smartphone, they would need to have safe access to one.

It helps to compare issuing benefits via a digital currency to issuing benefits via a prepaid card. Both require some way of tying the user's identity and receiving address (whether physical or digital) to the account in the Federal benefits database. Both could have some restriction on how they can be used, for example the way that SNAP benefits can only be used to purchase eligible items. Users already know how to use prepaid cards and they are mostly accepted at merchants. However, prepaid cards are physical, meaning that the person must either be reached in person to obtain one or have a secure mailing address to receive the card in the mail. At any point the card could be stolen or lost. A digital currency could be issued remotely without physical access in a way that could not be stolen in transit, but doing so safely would require confidence that the recipient at the other end really controlled the digital wallet address to which the funds were being sent.

India recently launched the e-RUPI to deliver Government benefits electronically via digital vouchers.[1] The e-RUPI is "a QR code or a SMS-string based e-voucher which is delivered directly to the phone of the beneficiary. A statement said that the beneficiary will be able to redeem the voucher without a card, digital payments app, or internet banking access at the service provider."[2] These are purpose- and person-specific vouchers, meaning they can only be redeemed by the person to whom they were issued and for that purpose. They appear to be compatible with SMS, so users will not require a smartphone to use the vouchers. Generally, the challenges with a mechanism like this are achieving interoperability

[1] "Introducing e-RUPI". *https://www.npci.org.in/what-we-do/upi/upi-erupi*, Accessed August 6, 2021.

[2] Sarkar, Shankhyaneel, "PM Modi Launches e-Rupi Digital Payment System". *Hindustan Times*, August 2, 2021.

and preventing fraud. India has already invested in and deployed digital identity (Aadhar) and a widely used, unified digital framework for payments (UPI), from which the e-RUPI can benefit.

Q.2. Could a digital currency reduce or eliminate mass fraud by foreign or domestic criminals in State benefits such as Unemployment Insurance? If so, how could a Central Bank Digital Currency help States deliver unemployment insurance more efficiently while avoiding making fraudulent payments?

A.2. Fraud in unemployment insurance is a serious issue and has risen during the pandemic. It is unlikely digital currency alone could help curb this fraud. Answering the question of if digital currency could be a part of a solution to reduce or prevent unemployment insurance fraud would require a deeper study into the techniques used to commit fraud in unemployment insurance and the systems used to determine when and how unemployment benefits are issued.

Q.3. Could digital currency establish bank accounts at birth tied to one's Social Security number and providing a direct and secure account for future benefits throughout one's life?

A.3. Banks could create accounts for citizens from birth today, but they do not. It is unclear if any of the reasons why they do not would be addressed by digital currency.

Social security numbers are notoriously insecure. In 2009 Carnegie Mellon researchers developed an algorithm to predict a person's social security number with startling accuracy knowing just their date and location of birth.[3] Attackers have stolen hundreds of millions of social security numbers, along with names and addresses, in data breaches.[4] [5] Based on this, mere knowledge of a social security number is not enough to establish a secure account tied to the individual who was officially issued that social security number.

It is possible to connect users' real-world identity with, instead of a social security number, a public key identifier which does not need to be kept secret. This can be used in tandem with a mathematically related secret key only the user knows to verify a user's identity (in combination, one might think of this as a user's digital credential). However, this is not currently how social security numbers are generated. In addition, at any point in time there is the risk the user loses access to their secret key or it becomes compromised, at which point they will need to generate an entirely new public key identifier. There must be some mechanism for users to request a new public key identifier and to resolve accounts if an attacker obtains access to a user's account. Estonia is an example of a country that has developed a rich infrastructure around digital credentials, making it easier to vote, pay taxes, and open bank accounts.[6]

---

[3] Acquisti, Alessandro, and Ralph Gross. "Predicting Social Security Numbers From Public Data". Proceedings of the National Academy of Sciences 106.27 (2009): 10975–10980.

[4] Mathews, Lee. "Equifax Data Breach Impacts 143 Million Americans". *Forbes*, September 7, 2017.

[5] Krebs, Brian. "Data Breach at Health Insurer Anthem Could Impact Millions". Krebs on Security, February 15, 2015.

[6] *https://e-estonia.com/solutions/e-identity/id-card/*

RESPONSES TO WRITTEN QUESTIONS OF SENATOR CORTEZ MASTO FROM J. CHRISTOPHER GIANCARLO

Q.1. *Distribution of Federal and State Benefits*—Could digital currency improve access to Federal benefits for people who lack access to a local financial institution or affordable ATM? If so, how?

A.1. I believe that the tokenized form of U.S. central bank digital currency (CBDC)—or Digital Dollar—that serves as the Digital Dollar Project's "champion model" [1] could improve access to Federal benefits and other Government assistant payments, including emergency relief payments, social security benefits, school meal vouchers, and food stamps for people who lack access to a local financial institution or affordable ATMs. Accordingly, a Digital Dollar could facilitate greater financial inclusion and more efficient benefit distribution by broadening access to services through innovative mechanisms including digital wallets.

In 2020, the U.S. enacted a variety of emergency relief measures to respond to the COVID–19 pandemic and related economic crisis, including direct payments to individuals to offset lost income. This initiative revealed deficiencies in the American financial system as 70 million Americans, including roughly 14 million unbanked adults, [2] waited one month or longer to receive their stimulus payments via paper check and often faced burdensome costs to cash their checks. Americans cumulatively paid an estimated total of $66 million in check cashing fees just to access these crucial benefits during the pandemic. [3]

Had a U.S. Digital Dollar been in circulation during the COVID–19 crisis with an effective means of identification, it would have enabled the sending of monetary relief instantaneously to the electronic wallets of targeted recipients with minimal or no costs for beneficiaries.

A Digital Dollar could also improve financial inclusion for un- and underbanked during noncrisis conditions and might even hold advantages over traditional bank accounts in terms of expanding access for underserved populations due to lower system costs and the ready availability of digital wallets. Given the limited but critically functional scope of a digital wallet, it is possible that the costs associated with providing individuals wallet services might be lower than the costs of hosting a traditional bank account, potentially removing a significant barrier to the financial system for too many Americans.

These digital wallets could allow the Federal Government to distribute a range of programs and Government benefits while allowing private sector providers to expand coverage of such services to un- or underbanked populations that have access to mobile devices. The wallet could easily be registered through a regulated hosting intermediary performing requisite Know Your Customer/Anti–

---

[1] "Exploring a U.S. CBDC", The Digital Dollar Project, May 2020 at: *http://digitaldollarproject.org/wp-content/uploads/2021/05/Digital-Dollar-Project-Whitepaper-vF-7-13-20.pdf.*

[2] "2017 FDIC National Survey of Unbanked and Underbanked Households", Federal Deposit Insurance Corporation, October 2018, at: *https://www.fdic.gov/householdsurvey/2017/2017report.pdf.*

[3] "Economic Impact Payments: Uses, Payment Methods, and Costs to Recipients", Brookings Institution, February 2021, at: *https://www.brookings.edu/wp-content/uploads/2021/02/20210216-Murphy-ImpactPayments-Final-3.pdf.*

Money Laundering (KYC/AML) checks and could come preloaded on mobile phones.

In order for this to be true, the digital wallet would need to prove to be less expensive from a technology, regulatory, and administrative perspective than alternatives and the current system.

Ultimately, the proposition that digital currency could improve access to Federal benefits for people who lack access to a local financial institution or affordable ATM is best tested in real-world pilot programs. It is one of the key propositions that the Digital Dollar Project intends to explore. [4]

Q.2. Could a digital currency reduce or eliminate mass fraud by foreign or domestic criminals in State benefits such as Unemployment Insurance? If so, how could a Central Bank Digital Currency help States deliver unemployment insurance more efficiently while avoiding making fraudulent payments?

A.2. Yes, a tokenized Digital Dollar recorded on new transactional infrastructure, potentially informed by distributed ledger technology (DLT), could be configured to provide the infrastructure necessary to support transactional security standards including antifraud and anticounterfeiting measures and could help States deliver unemployment insurance more efficiently and securely.

Fraud is among the most important challenges faced by State and local government assistance agencies. The United States Government Accountability Office estimates that fraudulent or improperly filed charges accounted for 1 out of 10 benefit payments in 2016 for a total of $77.8 billion in payments that were found to be fraudulent. [5]

A tokenized Digital Dollar could allow State and local agencies to distribute Government benefits directly to recipients with improved efficiency and transparency. The programmable nature of Digital Dollars would enable specific Government agencies to tailor how benefits are used and to whom they are distributed. A Digital Dollar could also reduce the cost and time associated with physically cashing a check. Furthermore, a Digital Dollar could inherently encompass qualities such as instantaneous verification to reduce counterfeit efforts and potential fraud and could be informed by distributed ledger technology (DLT), which enables multiple parties to keep records of transactions, improving reconciliation and further reducing fraud.

State government agencies do have partial direct banking relationships with some of the public through tax and social benefits, but their reach is not universal. A Digital Dollar, built securely to ensure antifraud measures, coupled with digital wallets opened with prerequisite KYC/AML checks, could enable States to distribute benefits efficiently and securely. This is another important topic that the Digital Dollar Project plans to explore with a real-world pilot program.

---

[4] "Digital Dollar Project: Exploring a United States Central Bank Digital Currency—Proposed Pilot Programs", The Digital Dollar Project, October 2020, at: *http://digitaldollarproject.org/wp-content/uploads/2021/05/PilotScenarios10-12-20.pdf.*

[5] "Important Welfare Statistics for 2020", Lexington Law, at: *https://www.lexingtonlaw.com/blog/finance/welfare-statistics.html.*

Q.3. Could digital currency establish bank accounts at birth tied to one's Social Security number and providing a direct and secure account for future benefits throughout one's life?

A.3. The Digital Dollar Project takes no position on other digital currency proposals including Federal Reserve accounts or "FedAccounts" and bank accounts tied to Social Security Numbers. The Project's focus is on advancing exploration of a U.S. CBDC that would fit within the existing two-tiered architecture of commercial banks and regulated money transmitters.

The Project proposes that the issuance distribution and redemption of Digital Dollars would take place just as cash does today: issuance by the Federal Reserve to domestic banks or regulated entities against reserves. It supports the maintenance of the existing two-tiered architecture of commercial banks and regulated money transmitters in deploying and recording Digital Dollars on new transaction infrastructure potentially informed by DLT.

The existing two-tiered system supports economic and legal advantages while inviting innovation and accessibility. Commercial banks and potentially other regulated intermediaries would exchange reserves for Digital Dollars to be distributed to end-users like how they currently issue physical cash to customers through ATMs.

While the Project's proposed "champion model" of a tokenized Digital Dollar would not establish bank accounts at birth tied to Social Security Numbers, end-users could access bank and digital wallet services through their smartphones. They could download a digital wallet app to make and receive payments with Digital Dollars after going through simple AML/KYC protocols. This digital wallet could act as an easy on-ramp to financial services and offer a more cost-effective tool to bring more un- and underbanked Americans into the financial system than any alternative that exists today.

RESPONSES TO WRITTEN QUESTIONS OF CHAIRMAN BROWN FROM LEV MENAND

Q.1. Millions of people in the United States do not have bank accounts or access to the payment system, which makes it difficult and expensive to participate in our economy. How should we design a central bank digital currency (CBDC) or digital dollar so that it makes our financial system and economy safer and stronger for workers and businesses? How can a CBDC work with the no-fee accounts in my Banking for All Act?

A.1. The no-fee accounts in the Banking for All Act should be the foundation of any U.S. CBDC. These accounts would be nondefaultable sovereign money in digital form, a liability of the Federal Reserve. It is critical that these accounts include fraud protection and customer service: if you lose your password there should be someone you can call. They should also have no minimum or maximum balances: there are no public benefits to restricting the use of nondefaultable sovereign money. To the contrary, allowing businesses and financial institutions to hold nondefaultable sovereign money in digital form will dramatically improve financial stability, reduce inefficiencies in the payments

system, and increase revenues to the Federal Government in the form of seigniorage. Congress might also consider adding further features, but at a minimum it should require basic account services like online bill pay and direct deposit. For more information about how the Government might structure a U.S. CBDC, see John Crawford, Lev Menand, and Morgan Ricks, "FedAccounts: Digital Dollars", 89 *Geo. Wash. L. Rev.* 113 (2013).

RESPONSES TO WRITTEN QUESTIONS OF SENATOR CORTEZ MASTO FROM LEV MENAND

Q.1. *Distribution of Federal and State Benefits*—Could digital currency improve access to Federal benefits for people who lack access to a local financial institution or affordable ATM? If so, how?

A.1. Yes. No fee public money could be designed to enable people to receive Federal benefits in account form and to withdraw cash at a post office without paying any fees.

Q.2. Could a digital currency reduce or eliminate mass fraud by foreign or domestic criminals in State benefits such as Unemployment Insurance? If so, how could a Central Bank Digital Currency help States deliver unemployment insurance more efficiently while avoiding making fraudulent payments?

A.2. Tying no fee, public bank accounts to individual social security numbers would make it easier for the Government to operate entitlement programs like unemployment insurance. States would likely distribute fewer payments by paper check, for example.

Q.3. Could digital currency establish bank accounts at birth tied to one's Social Security number and providing a direct and secure account for future benefits throughout one's life?

A.3. Yes. One important benefit of public digital money is that it offers the Government an easy way to automatically include all Americans within the payments system and to make payments to people cheaply and easily without relying on third-party intermediaries.

RESPONSES TO WRITTEN QUESTIONS OF SENATOR CORTEZ MASTO FROM DARRELL DUFFIE

Q.1. *Distribution of Federal and State Benefits*—Could digital currency improve access to Federal benefits for people who lack access to a local financial institution or affordable ATM? If so, how?

A.1. Yes, depending on the design. For example, those without a bank account would probably access a digital dollar with wallets on a phone app or on a smart card. Either way, Federal benefits could be distributed to those wallets. If by phone, payment is immediate. If by card, payment could be collected by the recipient at any of a system of authorized payment nodes.

Q.2. Could a digital currency reduce or eliminate mass fraud by foreign or domestic criminals in State benefits such as Unemployment Insurance? If so, how could a Central Bank Digital Currency help States deliver unemployment insurance more efficiently while avoiding making fraudulent payments?

A.2. Yes. If well designed, a UI payment could be made directly to the recipient electronically, eliminating paper-based payment methods and reducing the role of check-cashing agents that extract fees or conduct fraud. There would be no need to convert the Government's payment to another payment medium, like paper money or a bank deposit account. See my answer to the Question above.

Q.3. Could digital currency establish bank accounts at birth tied to one's Social Security number and providing a direct and secure account for future benefits throughout one's life?

A.3. I do not have the expertise necessary to judge whether the most effective identification link is to one's social security account number. This is one of a number of alternatives.

ADDITIONAL MATERIAL SUPPLIED FOR THE RECORD

STATEMENT SUBMITTED BY ECURRENCY

The United States Senate Committee on Banking, Housing, and Urban Affairs
Subcommittee on Economic Policy
"Building A Stronger Financial System: Opportunities of a Central Bank Digital Currency"
June 9, 2021
Statement for the Record - eCurrency

Introduction

Chairwoman Warren, Ranking Member Kennedy, Chairman Brown, Ranking Member Toomey, and members of the Committee; I would like to thank you for holding this hearing and would like to submit the following to the record.

It is critically important for Congress to investigate the foundational aspects of a Central Bank Digital Currency and to understand how a CBDC should be designed in order to maximize its benefits. I am honored to have the opportunity to address this important topic and I would like to take this opportunity to urge Congress to give the Federal Reserve and the Treasury the authority they need to create a digital US dollar and to set the standards for how a US CBDC should be created, how it should function, and what policy goals it should address. The good news is; the rules for how a digital currency should work are largely an extension of the rules for physical currency as they exist today. In other words, the model for central bank issued digital currency is central bank issued cash.

Background on eCurrency

My name is Jonathan Dharmapalan and I am the Founder and CEO of eCurrency; a digital security company and technology infrastructure provider, founded solely to create the technology to allow central banks, such as the US Federal Reserve, to issue Central Bank Digital Currency. We are not a cryptocurrency company and we do not issue any coin, stable coin or currency of our own. We believe that only the United States government can issue a digital US dollar and that the Federal Reserve and Treasury alone should have that authority.

eCurrency has spent years consulting with monetary policy experts and central banks around the world in order to determine how a CBDC should function. Through our research and pilot programs with central banks, we have concluded that the best approach is that CBDC should be modeled after physical currency (paper notes and coins) and should operate on the same rails that currently exists for the creation and distribution of physical money into the economy. This sentiment is shared by many of the thought leaders on this topic, including the Bank for International Settlements (BIS) and the International Monetary Fund (IMF).

Clear Policy Objectives

A foundational element for introducing a CBDC is understanding its purpose: What can a CBDC be used for, how can it be used, and what potential value does it provide? A recent Bank for International Settlements report highlighted a number of potential benefits for a CBDC. These include enhancing payment system resiliency, increasing payments diversity, encouraging financial inclusion, and improving cross-border payments.

Central bank interests in CBDC research and experimentation varies significantly. However, these interests generally fall into two broad categories. One set of central banks is primarily looking to address present-day challenges, while for others it is exploring future capabilities. For some jurisdictions, a CBDC is intended to address a specific problem — inefficient payment systems, weak banking infrastructure, or declining cash use — or to promote national policy goals, such as supporting payments inclusion and protecting monetary sovereignty. For many advanced economies, the primary motivations are centered on potential payments innovation and general preparedness for a potential future state when digital transactions become the predominant mode of commerce.

For the United States, whatever specific objectives may arise for a CBDC, they should be consistent with the Federal Reserve's longstanding objectives of the safety and efficiency of the nation's payments system, as well as monetary and financial stability. A CBDC arrangement must be in keeping with these objectives, which have guided the central bank since its establishment in 1913. These objectives should be complemented by the three foundational principles recently outlined by the Bank of Canada, European Central Bank, Bank of Japan, Sveriges Riksbank, Swiss National Bank, Bank of England, and Federal Reserve to "do no harm"; complement existing forms of money; and support innovation and efficiency. A CBDC arrangement should also support the Federal Reserve's broader work in consumer protection and community development.

Key Considerations

Financial Inclusion

A key requirement for a CBDC must be that it is accessible from a variety of digital payment vehicles. Any CBDC must be able to operate within the existing payment rails of the financial system including bank accounts, apps, and payment cards, while extending to smartphones, QR codes, and other innovative ways to store digital objects. The key to promoting financial

inclusion with a CBDC is interoperability. If the CBDC is designed to work across platforms and utilizing all available high- and low-tech solutions, it will provide the options necessary to allow previously disengaged users into the financial system. The result will not be that existing participants move to new platforms but that more users are able to engage with the digital financial system overall.

Responding to Private Digital Currencies

By issuing a CBDC the US can provide a stable alternative to currently available private digital currency like cryptos and stable coins. These options are not stable stores of value and are not suitable for use in day-to-day transactions. A federally issued digital form of the US dollar would serve as an alternative to the rise of these private digital currencies and provide consumers with the safety and stability that physical US dollars do today.

Protecting Privacy

Privacy is an important consideration for a CBDC. Digitalization of currency has many benefits and can be an immensely powerful utility, however if it is not implemented properly, it has the potential to invade individual and societal privacy. One of the common misconceptions about Central Bank Digital Currency (CBDC) is that it is antithetical to privacy. This misconception derives from the idea that the technology behind CBDC must be either a centralized ledger account (an account held at the Federal Reserve by the public) or a distributed ledger technology derived from the blockchain architecture of Bitcoin. Both approaches are based on a "ledger" and since the ledger associates the user with the value they are holding, neither approach ensures privacy. Any CBDC implementation must be able to protect individual privacy and personal information in accordance with the law. It is possible, using a model based on the functionality of cash, to ensure privacy is protected. The Federal Reserve would not need to collect user information and the private sector participants, including banks and digital wallet providers, would manage AML/CFT and KYC, just as they do today.

Ensuring US Leadership in Digital and Financial Technology

The US has the opportunity to set the rules for how digital currencies function in the international financial system. We understand how China plans to use its CBDC to surveil users and to attempt to sidestep the US dollar's position as the world reserve currency. The US can develop its CBDC to be a model for upholding privacy, promoting inclusion, and increasing innovation. This will undoubtedly assure that the US dollar continues to be the global standard in financial instruments.

Strong Legal Framework

A strong legal framework for the creation and the issuance of US dollar currency is clearly codified in the law. Today our cash currency comes in the form of notes and coins. This legal framework presents an opportunity to extend existing laws and practices to include a digital currency. The responsibility to securely produce notes and coins is placed on the Treasury of the United States. Extending that responsibility to the production of CBDC would be a natural extension of the role of the Treasury. The Federal Reserve can then fulfil its subsequent role as the issuer and distributor of the CBDC.

A principal role of the Federal Reserve in the U.S. financial system is to be the guardian of public confidence in money; hence the same sound legal framework is a key precondition. It serves as the bedrock that enables users of a general-purpose CBDC and the market more broadly to be confident that the instrument they use to transfer value is robust and reliable, functions smoothly and securely, and comes with clear rules and protections for the payment recipient and for the consumer. Any cracks would undercut the public's trust in the CBDC. Critical first steps toward building such a sound legal framework include formulating a clear position on the legal issues highlighted below.

Clear legal authority. A first-order consideration is whether the issuance of a general purpose CBDC would be consistent with the Federal Reserve's mandates, functions, and powers as enshrined in the central bank law, namely the Federal Reserve Act (FRA). The central bank exercises only powers and functions authorized under the FRA. For example, the FRA authorizes the Federal Reserve to issue Federal Reserve notes and to provide payment services to depository institutions and certain other entities. Consideration would need to be given as to whether additional amendments to the FRA would be required related to the issuance of a general-purpose CBDC.

Legal tender status. The topic of legal tender status is often raised in the context of CBDCs. In the United States, that status has specific meaning. By statute, all currency issued by the Federal Reserve is a valid and legal offer of payment for settling "debts" to a creditor. It is important to note that neither the statute nor any other federal law compels an individual or private business to accept currency or coins as payment for goods and services. Rather, these private-sector entities are generally free to develop their own policies on whether to accept cash, within the boundaries of any applicable state law and with appropriate notice. Although the status of CBDC as legal tender under U.S. law remains an open question, a general-purpose CBDC's recognition as legal tender would not guarantee its acceptance in commercial use; that would largely depend on the credibility of the CBDC, including the soundness of the legal framework underpinning it (for example, commercial law rules that facilitate market activities).

Privacy. It is both customary and an intrinsic feature of cash that transactions between parties remain private. In a CBDC environment, that privacy may not be a given and cannot be taken for granted. It will be essential to consider how privacy is respected and how personal data is protected in a CBDC arrangement. Legal requirements vary, depending on the role a particular party plays in handling or processing a payment transaction–whether the party is a bank, service provider to a bank, affiliated party, or communication provider. Depending on the design of a CBDC and the extent of the central bank's role in the arrangement, the central bank could have access to an unprecedented scale of granular transaction information; possibly, transactional data could be available to certain third parties (like banks and service providers) or, in the extreme, to everyone. This close linkage between money and data contrasts with physical banknotes, which do not carry with them transaction data that can be connected to a specific person and their history of financial dealings. The legal framework for privacy as it pertains to CBDC would require specific attention by it framers.

Anti-money laundering, countering the financing of terrorism, and addressing sanctions evasion. It is critical that such a legal framework, as a precondition, includes approaches to combatting money laundering and countering the financing of terrorism so as to mitigate the risk that the CBDC could become a favored medium for illicit activities, particularly given the ease and speed at which potentially large amounts of money could be transferred. As a point of comparison, illicit activities in connection with virtual currencies are not just limited to direct use in transactions to commit crime or to support terrorism (such as buying and selling illicit things), but also include use by bad actors to launder their illicit proceeds or hide financial activity from authorities (such as law enforcement, national intelligence, tax, or economic sanctions authorities).

Broad Stakeholder Support

Developing a CBDC requires input, engagement, and support from a range of stakeholders in both the public and private sectors and contributes significantly to market readiness. Though full agreement among stakeholders is likely impossible, an inclusive discussion and general consensus is a precondition. Key stakeholders include government bodies, end users, financial institutions, technology and infrastructure providers, academia, and standards development organizations. Broad stakeholder support will take time to achieve given the diverse interests involved and the number of complex decisions that will need to be made on system design and ecosystem development.

Government bodies. Governmental support is essential to facilitating the legal and societal changes that would be needed for the introduction of a CBDC. The legislative and executive

branches of government would need to make critical decisions affecting the design and implementation of a CBDC. Consideration by Congress, for example, must be given to key areas such as the authority of the Federal Reserve to issue a general-purpose CBDC, the potential sea change in the relationship of the central bank with the public, and potential legislative changes related to contract law, privacy, and consumer protection. Executive branch support is also needed from federal agencies on a number of design and implementation issues, including those related to tax, public spending, counterfeiting and fraud, anti-money-laundering, and cybersecurity. Coordination and harmonization of regulatory frameworks across various jurisdictions would also require the support of government at both the federal and state levels.

End users. Usability will be key given that a general-purpose CBDC must be designed for the people and organizations who use money to pay for goods and services. Including end users of various ages, geographic locations, payment habits, and financial literacy in the design and testing of a CBDC could help sharpen the basic features of a viable CBDC arrangement. For example, how will people use a CBDC–through a smartcard, smartphone, fingerprint, iris scan, or something else? Why would they choose a CBDC over another payment instrument? To make a CBDC that appeals to merchants, its designers will need to include benefits for retail transactions. These might include being a less expensive and faster alternative to existing payment options.

Engaging with individuals and businesses and consulting with consumer groups, community organizations, and business associations to understand the use case for a CBDC will help in the decision whether to issue a CBDC and its potential design. End-user input on privacy and usability would be particularly useful in designing a CBDC. Questions related to privacy would include identifying what type of information is kept on the system, who owns the information, who has access to it, and how it can be used. End-user input on security will also be important depending on the design on the system. For example, how much responsibility does the end user want when considering the tradeoffs that may need to be made with consumer protection and loss allocation?

Financial Inclusion. Additionally, while the current payments system works well for most, a CBDC could help address unmet needs. According to a 2019 Federal Deposit Insurance Corporation report, 5.4 percent of American households had neither a savings nor a checking account, which means they might not have direct access to the bank intermediated payment system. A recent Federal Reserve Bank of Atlanta report noted that "access to digital payment vehicles that don't depend on traditional bank accounts" may be an effective approach to addressing the needs of unbanked Americans. Although a significant group of Americans are unbanked, they can and are participating in digital payments utilizing nonbank mobile money service providers. As such, the digital dollar would help advance financial inclusion by

introducing a CBDC instrument which can be used across different bank and nonbank payment networks. Moreover, transactions data could be used by financial intermediaries for information-based risk assessment for lending purposes, which would also be positive for financial inclusion. Engaging with end users or the groups that represent unbanked Americans can help determine whether or how a CBDC could be designed to support payment inclusion goals.

Financial institutions. Introduction of a CBDC could result in significant changes to market structure and dynamics. There are important questions about the potential role of banks and other financial institutions in a CBDC arrangement. A CBDC might affect commercial bank deposits, bank credit, and the broader financial system. However, it is also possible there would be little to no disruption to the banking sector, depending on the features of a CBDC and how it is implemented. Engaging broadly with financial institutions of many types, from global systemically important banks to local community banks to internet-only banks, would inform policymakers on potential impacts, benefits, design considerations, and policy requirements.

Technology and infrastructure providers. Technology and infrastructure firms play a significant role in today's market, and support from these groups is a precondition of a CBDC issuance. A potential CBDC may take many different forms, some of which could be achieved through existing technology and infrastructures. Or it could use newer technologies, such as distributed ledgers, that are not widely used today. Or it could use a combination of existing and new technologies. CBDC arrangements may also allow or accelerate the entry of new providers, such as bigtech and fintech, into payment or other financial services. Incumbent firms that are unable or unwilling to embrace or develop new capabilities may experience negative impacts as new entrants emerge. Understanding these dynamics will inform design choices and help address questions of CBDC design, interoperability, market structure, and market adoption.

Others. Other stakeholders, such as academic institutions, think tanks, standards organizations, and the international community, can inform and support the foundations of a CBDC. Academic institutions and think tanks can provide thought leadership to inform policymaking. Standards organizations can contribute by defining terms, developing taxonomies, and creating specifications and standards in support of the broader ecosystem. The international community, such as other central banks and policy makers, is also important given the role of the U.S. dollar in international trade and finance as well as the opportunity to learn from CBDC pilots or initiatives in various jurisdictions. Other questions include how visitors and foreign businesses might access a CBDC, how it could be used offshore, and what rules should govern this type of use.

Congress needs to set the rules

The foundation of a CBDC must be derived in policy. Congress needs to set the standards by which the technology developed to create CBDCs are evaluated. It is our view at eCurrency that the technology solution should follow the laws and standards laid out by Congress, the Federal Reserve, and the Treasury and that these entities should not develop standards in order to conform with one technology's capabilities. In other words, the government should enumerate what standards a CBDC should meet and require that technology providers comply.

What should a CBDC look like?

In order to address the needs of the economy and represent an improvement on the current financial system a CBDC should achieve the following:

- **Creation** – CBDC should be created under the control of Treasury and the security technology used to create digital currency should remain under the control of the Secretary of the Treasury.
- **Issuance** - The issuance of the digital currency should be recognized as a liability of the Federal Reserve and it should remain fully fungible with Federal Reserve notes.
- **Distribution and Interoperability** – The digital currency should be distributed using secure technology to commercial banks and made accessible via existing payment systems
- **Security** – The digital currency must be safeguarded against counterfeiting and quantum computing risks through the use of both appropriate security technology
- **Resilience** – The digital currency needs to be resilient from operational disruption
- **Oversight** – The Federal Reserve and the Treasury will govern, control, and oversee the digital currency
- **Settlement** – The digital Currency must achieve instant and final settlement
- **Efficiency** – The digital currency should be capable of scaling massively with minimal energy consumption
- **Accessibility** – Users of the digital currency must have 24/7/365 access to digital currency through bank and non-bank payment service providers. It should be accepted by individuals and businesses, fungible with other forms of legal money
- **Inclusivity** – The digital currency must be accessible to and used by individuals who are unbanked or have limited engagement with the financial system

- **Ease of Use** – Digital currency should be able to be stored and used in the most convenient and intuitive ways through e-wallets, payment cards, smart phones, QR codes, etc.
- **Privacy** – The personal/identifying information of users must be protected in accordance with the law
- **Reporting by Intermediaries** – Financial integrity should be safeguarded through AML/KYC/CTF compliance using existing reporting systems of financial intermediaries
- **Stability and Transaction Limits** – The digital currency should meet financial system stability considerations by the ability to set e-wallet holding and transaction limits
- **Programmability Experience** – The digital currency's applications layer should be programmable by financial intermediaries to meet contractual obligations and for customer-facing services
- **Green CBDC** – The CBDC should aim to be 'green' in terms of a low-carbon footprint, which could be measured by the energy use per transaction.

What can Congress do now to advance our progress towards a CBDC?

In order to advance our understanding of CBDCs and encourage the study of a digital US dollar, Congress should take the following steps:

- Congress needs to address the definition of legal tender in the US code to add digital currency to the current standard of notes and coins.
- Congress should also clarify the roles of the Federal Reserve and the Treasury in the creation and issuance of digital currency. In order for digital currency to work it must function the same way as cash which is created by the Treasury and issued by the Federal Reserve.
- As previously mentioned, Congress must set the standards by which a digital currency will be created and set up policy goals that one should achieve.
- Congress should also encourage the Federal Reserve and the Treasury to initiate a digital US dollar pilot program and appropriate funds to carry it out. The results of this pilot can then be reported back to congress to inform its policy decisions.

Conclusion

Issuing a CBDC in the United States would not be an easy task. A number of foundational elements would be required. Having clear policy objectives is key in guiding the design of a CBDC. Establishing broad stakeholder support is needed to affect the social and legal changes

needed to refine how society thinks about money and how Americans use it. A strong legal framework must provide the legal basis for the issuance, distribution, use, and destruction of a CBDC. Moreover, a CBDC must be supported by robust technology that ensures its safety and efficiency. Lastly, market readiness is needed for widespread acceptance and adoption. These preconditions, and the work it takes to achieve them, are interconnected such that efforts in one area may lead to developments in another. These developments could strengthen or weaken the forces for change towards a general-purpose CBDC issuance. Each of the preconditions on its own will take significant time to achieve, and these preconditions represent only a starting point. Fortunately for us the model for a safe and secure currency that meets all of these requirements is already in place. It is the model we use for issuing cash (notes and coins). We do not have to invent a new model. If we demand that the most secure digital technology is leveraged to support the digital dollar, we can enable a safe and secure CBDC in the United States.

STATEMENT SUBMITTED BY THE AMERICAN BANKERS ASSOCIATION

Statement for the Record

On Behalf of the

American Bankers Association

Before the

Subcommittee on Economic Policy

Of the

Committee on Banking, Housing, and Urban Affairs

June 9, 2021

Chairwoman Warren, Ranking Member Kennedy, and members of the Subcommittee on Economic Policy, the American Bankers Association (ABA) appreciates the opportunity to submit a statement for the record for the hearing titled "Building a Stronger Financial System: Opportunities of a Central Bank Digital Currency." The topic of today's hearing is an important one, with significant implications for our financial system, economy, markets, and most importantly for the American consumer.

Policymakers around the world, including at the U.S. Federal Reserve, are examining the potential opportunities and risks associated with issuing Central Bank Digital Currencies (CBDCs).[1] A number of central banks are moving from conceptual research to developing pilot programs to explore the uses and efficiency of CBDCs.[2] As this work progresses, there is a growing recognition that central bank digital currencies may be weighed down by very significant real-world trade-offs. The reality is that the dollar is largely digital today. The proposed benefits of CBDCs to international competitiveness and financial inclusion are theoretical, difficult to measure, and may be elusive, while the negative consequences for monetary policy, financial stability, financial intermediation, the payments system, and the customers and communities that banks serve could be severe.

The primary reason for this disconnect between the commonly-touted benefits of CBDCs and the more privately-assessed risks of re-engineering our financial system is that we tend to treat CBDCs superficially, as though a digital currency is a single concept, and one that could be implemented beside, rather than on top of, our existing system. Neither is true. A CBDC is not a single proposal; rather, it refers to a wide range of different proposals with varied potential designs, each with specific costs and benefits. Nor does CBDC fill a fundamental gap in our financial architecture that it could slide neatly into to perform a discrete role. Some designs are

[1] In its simplest terms, a CBDC is a digital representation of a country's government-issued, central-bank-controlled money (a "digital dollar"). A CBDC would be a liability of the central bank, just as the dollar is today.

[2] *See* BIS Papers No. 114, *Ready, Steady, Go? – Results of the Third BIS Survey on Central Bank Digital Currency* (Jan. 2021), https://www.bis.org/publ/bppdf/bispap114.pdf.

more disruptive than others, but all have the potential to transform the way money flows through our economy in ways both intended and unintended.

The Highlight Reel Effect

Current policy discussions often fail to acknowledge that many of the purported benefits of CBDC are mutually exclusive and driven by how the CBDC is designed. Choosing between the various designs requires serious and complex policy tradeoffs. Too often CBDC proponents take a "highlight reel" approach to describing CBDC, cherry picking all the perceived benefits, while downplaying the serious risks to consumers and our financial system. In particular, all CBDC designs would take the money currently held on bank balance sheets and place it directly on that of the Federal Reserve.[3] In today's economy, most money takes the form of bank deposits. Money—and therefore deposits—is created through the private credit allocation process, which is a critical driver of economic growth and prosperity. Taking deposits out of the banking system would disrupt this key economic function by bifurcating deposit taking and lending, making lending more expensive, among other things.[4]

Federal Reserve Chairman Jerome Powell highlighted the importance of this in a recent video where he noted that any potential CBDC "serve as a complement to and not a replacement of cash and current private-sector digital forms of the dollar such as deposits at commercial banks."[5]

The U.S Already Has the Most Robust Financial System in the World

As Governor Brainard has recently noted, "In any assessment of a CBDC, it is important to be clear about what benefits a CBDC would offer over and above current and emerging payments options, what costs and risks a CBDC might entail, and how it might affect broader policy objectives."[6]

For example, it is unclear what policy goals a CBDC would achieve in the United States. For some countries, a CBDC could enhance weak or nonexistent financial systems. Unlike many other countries, the United States has a well-developed and robust financial system that is the backbone of our economy and markets. As they have done for hundreds of years, American banks today provide a broad array of essential financial and economic functions that benefit

[3] In a May 24, 2021 speech Federal Reserve Governor Lael Brainard highlighted these concerns noting, "Banks play a critical role in credit intermediation and monetary policy transmission, as well as in payments. Thus, the design of any CBDC would need to include safeguards to protect against disintermediation of banks and to preserve monetary policy transmission more broadly."
https://www.federalreserve.gov/newsevents/speech/brainard20210524a.htm.

[4] Even a CBDC with account limits would likely have a significant impact on the deposit base. The ECB estimates that a CBDC with account limits of €3,000 would lead to deposit outflows of € 1trillion.

[5] Chair Powell's Message on Developments in the U.S. Payments System, May 20, 2021
https://www.federalreserve.gov/videos.htm.

[6] Lael Brainard, Member Board of Governors of the Federal Reserve System, "Private Money and Central Bank Money as Payments Go Digital: An Update on CBDCs," Remarks at the Consensus by CoinDesk 2021 Conference Washington, D.C. (May 24, 2021), https://www.federalreserve.gov/newsevents/speech/brainard20210524a.htm.

their communities, most notably, safekeeping deposits and making loans. For other countries, a CBDC could enhance their payment systems. The United States, however, has one of the most efficient, safe, and modern payments systems in the world. Banks have invested significant resources in expanding faster, safer, more inclusive options, including P2P, real-time payments systems (*e.g.*, The Clearing House Real Time Payment Network (RTP) and the Federal Reserve's FedNow), and upgraded Automated Clearing House (ACH) products. Solutions to pay gig workers instantly and put funded bank accounts into the hands of disaster victims have recently come online, addressing key use cases proffered for CBDC.

The United States should not implement a CBDC simply because we can or because others are doing so. Policy changes of this magnitude should be driven by a careful analysis of the benefits and risks. A CBDC may be beneficial in an economy that does not have an advanced payment system or a robust banking system, or in jurisdictions where the central government is already a major provider or facilitator of financial services and expectations of individual privacy are not strong. **However, after a careful review of the benefits and risks of various proposals to implement a CBDC, it does not appear that a CBDC is well-positioned to enhance underlying financial capabilities or extend the reach of financial services in well-developed markets, at least not in the U.S. context, despite the overly optimistic promises from proponents.**

Policymakers Should Proceed with Extreme Caution

Given the important policy implications of CBDC and the potential to disrupt the U.S. financial system, we support the Federal Reserve's thoughtful and considered approach. The forthcoming Federal Reserve Bank of Boston findings will be an important next step for understanding the feasibility of this novel technology in our unique economy.[7] We further support the Federal Reserve's recognition that the development of a CBDC would require input, engagement, and support from a range of stakeholders in both the public and private sectors. To this end, we look forward to responding to the discussion paper the Federal Reserve intends to issue this summer, which, according to Chairman Powell, will outline the Federal Reserve's current thinking on digital payments, with a particular focus on the benefits and risks associated with CBDC in the U.S. context.[8] Before the introduction of a CBDC, we believe the Federal Reserve Board, with input from the Treasury and the other banking regulators, should publish a rigorous analysis that assesses the benefits and risks of a CBDC and that convincingly establishes (if findings warrant) that a CBDC would not create adverse impacts on consumers, markets, or the economy.

---

[7] *See* "The Federal Reserve Bank of Boston Announces Collaboration with MIT to Research Digital Currency" (Aug. 13, 2021), https://www.bostonfed.org/news-and-events/press-releases/2020/the-federal-reserve-bank-of-boston-announces-collaboration-with-mit-to-research-digital-currency.aspx.

[8] The authority of the Federal Reserve to issue CBDC remains an open—and fundamental—question in this policy debate, which must be resolved before Federal Reserve action on this issue. Chairman Powell has expressed reluctance to proceed with a CBDC without Congressional approval. *See* American Banker, "'We don't need to rush' on Fed digital dollar, Powell says" (Mar. 22, 2021), https://www.americanbanker.com/news/we-dont-need-to-rush-on-fed-digital-dollar-powell-says (quoting Powell as saying, "I think that would ideally come in the form of an authorizing law, rather than us trying to interpret our law, to enable this").

In the remainder of this testimony we will:

- Outline the risks and benefits of CBDC designs being considered today, and
- Highlight the challenging tradeoffs policymakers face in achieving their intended goals.

CBDC Design Choices Matter

The potential benefits and risks of a CBDC depend heavily on the way it is structured, making it impossible to evaluate the merits of CBDC in the abstract. Design choices involve tradeoffs, and so we must avoid a rush to action driven by cherry-picked benefits. By contrast, some of the disadvantages and risks of CBDC carry across all designs.

While a number of factors affect the theorized operation of a CBDC (*e.g.*, whether to use distributed ledger technology or a centralized database), the most important factors are *architecture*, or the role of the central bank in the distribution of CBDC, and *access*, or consumer's utilization of CBDC.[9] The following identifies some of the most significant potential benefits and risks of each architecture and access design choice that policymakers should consider as they determine whether to implement a CBDC in the United States.

Architecture Choices

Architecture goes to the operational role of the central bank in the CBDC. There are a number of different CBDC architectures, but the two principal models are (1) a "direct" CBDC that provides retail consumers with central bank accounts and (2) an "intermediated or hybrid" CBDC (or "two-tiered" model) where the distribution of CBDC would be through a commercial bank or other financial intermediary, such as a nonbank digital wallet provider.[10]

The following sets forth some of the purported benefits and potential risks of these models.

Direct CBDC	
Potential Benefits	***Potential Risks***
➢ Provides additional monetary policy tools (*e.g.*, increases influence on deposit rates and reduces the risk of alternative units of account—such as privately-	➢ Takes money out of the real economy, diverts deposits and stymies money creation, thereby

[9] We assume that, in whatever form it takes, CBDC will be compatible with other forms of money (cash, bank notes) and interoperable with pre-existing payment systems that choose to interface with it. Financial institutions, consumers, and end users also should remain free to use CBDC or continue to use conventional digital or physical currency.

[10] A wholesale CBDC model, which focuses on cross-border payments, also raises a number of difficult policy issues, but is beyond the scope of this testimony. Depending on its structure, including whether such a payments system would be interoperable with existing systems, this could adversely affect U.S. payments systems.

issued cryptocurrencies—dominating) ➢ May improve access to financial services and enhance financial inclusion ➢ May facilitate direct government disbursements to citizens ➢ May improve efficiency of payment system by some measures	undermining commercial lending and the deposit insurance system ➢ Makes the Federal Reserve a massive retail bank, introducing significant costs and operational burdens (*e.g.*, interfacing with customers, building front-end wallets, fraud resolution/mitigation), as well as fundamentally changing the mission of the central bank ➢ Likely would lead to less privacy than for those using cash or other forms of digital payments

Intermediated or Hybrid CBDC	
Potential Benefits	***Potential Risks***
➢ Decentralized relative to other models (*e.g.*, central bank will not have customer relationship) ➢ Facilitates compliance with anti-money laundering (AML)/combating the financing of terrorism (CFT) and know your customer (KYC) frameworks ➢ Provides a more convenient and modern alternative to paper cash ➢ Means of countering new private digital currency	➢ Potential for CBDC to move out of banks into non-bank financial institutions ➢ If counted as cash, likely would not be available to support lending in the real economy ➢ Raises information security risks and the potential for fundamental design mistakes ➢ Changes the economics of the payments system, potentially reducing incentives for product innovation

Takeaways:

Policymakers throughout the world have generally concluded that the direct model is not feasible because of the increased costs and operational burdens placed on central banks.[11] A direct CBDC model would effectively set the Federal Reserve up as a retail bank to every household in the nation. This would present an immense operational burden on the central bank, which would be responsible for onboarding customers and servicing those accounts. Today U.S. banks employ over 2 million employees to accomplish the same goal. Among the most critical technical and operational challenges that would need to be dealt with is the risk of creating a global target for cyberattacks or a new avenue for money laundering. A CBDC could be a very attractive target for cyberattacks.[12]

If policymakers determine that a CBDC is warranted to address payments system gaps, a "two-tier" CBDC architecture should form the basis of further work. Under this approach, the Federal Reserve would continue to focus on monetary policy and the underlying design of CBDC, and only commercial banks and appropriately regulated and supervised financial institutions should be permitted to distribute CBDC.[13]

Access Choices

Access addresses how consumers can utilize CBDC. Generally speaking, CBDCs may be account-based or token-based.[14] A key difference between the two types of access is the mode of verification when a transaction takes place. Account-based CBDCs are tied to an identity scheme, similar to existing bank accounts. In an account-based system, the accountholders on either end of the transaction are authenticated. Token-based CBDC is more similar to cryptocurrencies and would be freely transferrable tokens, which may be held in an "unhosted"

---

[11] This appears to be the approach the ECB is taking. *See, e.g.*, Fabio Panetta, Member of the Executive Board of the ECB, "Evolution or Revolution? The Impact of the Digital Euro on the Financial System," Bruegel Online Seminar (Feb. 10, 2021), https://www.ecb.europa.eu/press/key/date/2021/html/ecb.sp210210~a1665d3188.en.html ("[t]he ECB does not plan to interact directly with potentially hundreds of millions of users of a digital euro. We simply would not have the capacity or the resources to do so. Financial intermediaries—in particular banks—would provide the front-end services, as they do today for cash-related operations. We would provide safe money, while financial intermediaries would continue to offer additional services to users.").

[12] *See, e.g.*, Lael Brainard, Member Board of Governors of the Federal Reserve System Cryptocurrencies, "Digital Currencies, and Distributed Ledger Technologies: What Are We Learning?" Remarks at the Decoding Digital Currency Conference Sponsored by the Federal Reserve Bank of San Francisco, San Francisco, California (May 15, 2018), https://www.federalreserve.gov/newsevents/speech/files/brainard20180515a.pdf.

[13] The Federal Reserve is keenly aware of the longstanding legal and policy framework maintaining the separation of banking and nonbank commercial activities. If it decides that private-sector financial intermediaries should play a role in CBDC distribution and transactions as intermediaries, it should assure that this separation is maintained, taking into consideration whatever aspects of banking functions such intermediaries ultimately play.

[14] *See* Alexander Lee, Brendan Malone, and Paul Wong, FEDS Now, "Tokens and Accounts in the Context of Digital Currencies" (Dec. 23, 2020), https://www.federalreserve.gov/econres/notes/feds-notes/tokens-and-accounts-in-the-context-of-digital-currencies-122320.htm (highlighting some issues with the "tokens vs. accounts" dichotomy).

digital wallet on the holder's smartphone.[15] In a token-based system, the token itself is authenticated. This makes the token a bearer instrument, much like cash today.

The following sets forth some of the purported benefits and potential risks of these models.

Token-Based CBDC	
Potential Benefits	***Potential Risks***
➢ More consumer privacy in comparison to account-based models ➢ Promotes ease of transfer ➢ More resilient to infrastructure outages and cyberattacks ➢ Most like digital cash ➢ Frees the central banks from the duties of large-scale account keeping and reconciliation	➢ Complicates compliance with AML/CFT and KYC frameworks ➢ May drain deposits from banks and the real economy, reducing the amount available for banks to lend. ➢ May lead to destabilizing runs on bank deposits into central bank money ➢ Introduces risk of loss or theft of the private key for the token

Account-Based CBDC	
Potential Benefits	***Potential Risks***
➢ Most akin to traditional bank accounts ➢ Facilitates compliance with AML/CFT and KYC frameworks ➢ Helps to preserve banks' deposit base, and money creation function that is essential to lending and economic growth	➢ May not achieve the potential benefits of introducing CBDC ➢ May pose threat to financial anonymity and privacy for citizens ➢ May not be available to support lending in the real economy

[15] An "unhosted" wallet describes situations where transactions from the wallet do not require the use or involvement of a financial institution.

Takeaways:

In considering the trade-offs between account-based and token-based CBDC, including the ability to use unhosted wallets and engage in offline transactions, policymakers should ensure they are not facilitating money laundering or more generally impeding the ability of financial institutions to comply with AML/CFT and KYC frameworks, or to respond to lawful government orders. They should also be mindful of privacy concerns related to direct government oversight of consumer accounts. These two objectives are difficult to reconcile and may be mutually exclusive.

Policymakers Face Challenging Tradeoffs to Achieve Desired Outcomes

As discussed above, the various designs of CBDC being considered today all come with significant tradeoffs. As policymakers consider how to achieve their desired outcomes, they must seriously consider these tradeoffs. The intended benefits of implementing a CBDC are often less than expected, given these tradeoffs. In some cases, these benefits may be effectively non-existent because they come at such a high cost. Below, we briefly describe some key considerations for policymakers as they look to achieve their desired outcome.

Risks

Financial Intermediation:

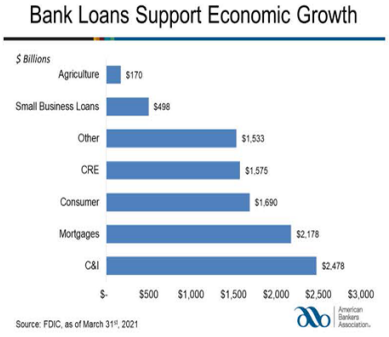
As noted above, every construction of CBDC requires moving funds from banks' balance sheets to the Federal Reserve. Regardless of the model chosen, a CBDC is a direct liability of the central bank. This contrasts to bank deposits, which are a liability on an individual bank insured by the Federal Deposit Insurance Corporation (FDIC).

In effect, these accounts will serve as an advantaged competitor to retail bank deposits that will move money off bank balance sheets where it can be lent back into the economy and into accounts at the Federal Reserve. Philadelphia Fed Research referenced above found that these proposals would create a "deposit monopoly" that would "attract deposits away from the commercial banking sector."[16]

While depositors at FDIC insured banks have never lost a penny of an insured deposit, it is hard to compete with a government agency that prints that money. Philadelphia Federal Reserve research found that depositors value this and will, in equilibrium, choose to hold their funds at the Federal Reserve instead of at retail banks, establishing the Federal Reserve as a "deposit monopolist."

[16] https://www.philadelphiafed.org/-/media/frbp/assets/working-papers/2020/wp20-19.pdf.

These bank deposits are the primary funding source of bank loans. These loans are critical drivers of economic growth and prosperity. In the United States today, banks fund more than $10 trillion in loans. This includes $2.1 trillion in consumer mortgages, $1.6 trillion in consumer loans, and $498 billion in small business loans.[17] Any reduction in this deposit base would quickly impact consumers and small businesses in the form of reduced credit availability and increased cost, undermining the goal of financial inclusion and undercutting economic growth.



Some models seek to minimize this effect by capping the amount of funds that can be held in CBDC. However, this limits the potential benefits of a CBDC account. These limits would reduce the business use cases often cited as in arguments for CBDC's ability to promote international competitiveness. It also does little to offset the problem. For example, the ECB estimates that a CBDC with account limits of €3,000 would lead to deposit outflows of €1 trillion.

Unlike retail banks, the Federal Reserve is not prepared to make loans to consumers and businesses. As deposits migrate from bank balance sheets to the Federal Reserve, capital that fuels economic growth will be severely restricted.

In times of economic hardship, the bank balance-sheet driven model is even more important. Banks' balance sheets and strong capital position allow them to make long-term investments and continue lending throughout a downturn, just when it is needed most.

A digital currency also creates a risk to financial stability. In times of economic stress, depositors are likely to prefer holding their money at the Federal Reserve. This creates a risk of bank runs that would undermine financial stability.

Anti-Money Laundering, Sanctions Enforcement, and Countering the Financing of Terrorism:

One significant challenge associated with many CBDC models is whether the central bank has the ability to identify users and track funds held in CBDC. Today, it is difficult to track the movement of physical cash throughout the economy. There is significant investment in programs to address this; however, any of those rely on the fact that is logistically challenging

[17] Federal Deposit Insurance Corporation Quarterly Banking Profile (May 26, 2021).

to move large amounts of physical cash. Simply put, it is difficult to move large volumes of physical cash. Digitizing that cash as a CBDC allows users to more easily move larger sums, making a CBDC more attractive to those looking to circumvent these important measures.

In the case of a direct CBDC, the Federal Reserve would be able to control for account onboarding and implement these checks itself. However, the operational burdens of doing so are significant. Today U.S. banks employ an estimated 20,000 employees to accomplish this.

Moving to an indirect model does not solve this challenge either. A token-based CBDC presents even more challenges to implementing these controls. Token-based CBDCs are authenticated by the token (not the user) similar to many cryptocurrencies in the market today. These tokens are held in software-based programs like "unhosted" digital wallets. Regulators could police the access points to these assets but will have little control once they leave that controlled environment.

Minimizing this risk would point to an indirect, account-based CBDC. These would function similarly to bank accounts today; however, as discussed below this also minimizes many of the purported benefits associated with CBDC.

Privacy

Another challenging question around the implementation of a CBDC is the level of insight that governments have into the use of CBDC. Unlike physical cash, many constructions of CBDC allow the government to directly track and monitor the use of these assets. This raises important public policy questions around the appropriate role of government.

Pervasive government surveillance of consumer and commercial payments may be considered a benefit to some governments issuing CBDC, but this feature should not be taken lightly in a democracy where the government is not meant to have access to the details of financial transaction without proper legal cause.

There are models that minimize this risk, like an indirect token-based CBDC, but this involves a tradeoff in the ability to monitor for illicit uses of CBDC as discussed above. In many cases privacy is mutually exclusive with the objectives of AML/KYC programs.

Role of Government

By making a governmental body into the nation's near-monopoly provider of currency, bank accounts, and payment services, the Federal Reserve would quickly become politicized as the central control point for monitoring and potentially denying transactions. For controversial but locally-regulated purchases such as cannabis and firearms, a CBDC would entangle the Federal Reserve as a national arbiter of social issues.

Desired Outcomes

Financial Inclusion

A foundational goal of direct CBDC proposals (and similar proposals like postal banking) is to promote financial inclusion. Access to banking services provides people with a means to save for their future and economic opportunity that is critical to promoting social equity. This is an important and urgent goal.

The pandemic has laid bare the consequences of being unbanked, from delays in receiving stimulus payments to navigating additional barriers in the Paycheck Protection Program. Sustainable economic opportunity requires a long-term banking relationship, but according to the FDIC's 2019 "How America Banks" survey, despite some encouraging trends, over 7.1 million US households – 5.4% – remain unbanked, and another 24 million households are underbanked.[18] While the FDIC observed "particularly sharp" declines between 2017 and 2019 for Black and Hispanic households, 13.8% of Black households and 12.2% of Hispanic households remained entirely unbanked in 2019, "substantially above the unbanked rated for White households (2.5 percent). Our nation and industry can do better.

America's banks are committed to promoting financial inclusion and are working to address this challenge. Today, unbanked customers have numerous options to open bank accounts that are designed to address the reasons most unbanked individuals cite as barriers to becoming banked. Through the Bank On program, run by the Cities for Financial Empowerment Fund and other efforts, free and low-cost bank accounts are widely available at banks of all sizes, with new accounts being certified every day. Bank On sets account standards that provide a benchmark for safe, affordable accounts at mainstream financial institutions, setting consumers on a path toward financial inclusion. Today, these accounts are available at over 32,500 branches across the United States. And importantly, they represent the beginning of a banking relationship, which can grow to include lending, saving, investing and other opportunities.

As the government rushed to distribute millions of Economic Impact Payments during the COVID-19 pandemic, the FDIC, the IRS, Bank On and the ABA worked to promote awareness of such accounts so American taxpayers could receive their payments quickly and securely. We have another critical opportunity to promote Bank On-certified accounts ahead of the expanded and newly-advanceable Child Tax Credit payments, which will be available to 36 million taxpayers starting in July.

Unlike programs like Bank On, it is unclear whether access to a direct account at the Federal Reserve would address the reasons families report not having a banking relationship.

[18] Underbanked means that a household has an account at an insured institution but also obtained financial products or services outside of the banking system.

Moreover, by taking too narrow a view of the problem, these proposals risk undermining the real progress underway with Bank On and similar efforts.

In addition, direct CBDC proposals focus solely on the question of access to a deposit account. While it is true that deposit accounts are often the first step towards inclusion, the benefits of a long-term banking relationship go well beyond a deposit account. The same is not true of a CBDC account with the Federal Reserve, which would not grow into a lending or investing relationship.

Not only do direct CBDC proposals not address this serious issue, they will likely exacerbate it. Philadelphia Fed Research referenced above found that these proposals would create a "deposit monopoly" that would "attract deposits away from the commercial banking sector." This has the effect of reducing the funds on banks balance sheets that is available to lend which would reduce access to credit to the communities that need it the most.

Payments system efficiency

Many CBDC proponents cite the need to speed up payments by digitizing them; the reality is that the majority of payments in the U.S. are already digital. Today, consumers and businesses have the option to pay with credit or debit cards, payments applications like Zelle or Venmo, and via ACH.

Efforts to modernize and speed up our payments system have been underway for some time and are already being implemented. The Federal Reserve's 2017 Faster Payments Task Force examined the entirety of the payment system and its experts, including consumer groups, recommended faster networks – not a new currency. As a result of these efforts, the Federal Reserve is building out an instant payments solution called FedNow.

Industry has been driving these improvements as well. The RTP Network is a brand-new instant payment system that represents an advancement equivalent to moving from dial-up to broadband in terms of speed and features. ABA was a strong advocate for using this capability as part of the EIP program to speed electronic payments to those with bank accounts or even prepaid cards.

Together, RTP, FedNow, and faster ACH systems are forming a web of super-fast, low-cost or free digital payment options that will make waiting for days to receive a payment a thing of the past.

Conclusion

A U.S. CBDC could fundamentally change the role of the central bank in the United States and reshape the banking system. Given the additional complexity, delay, and transition costs involved in creating a new form of money, there are strong efficiency interests that suggest

CBDC should only be pursued as a final option to meet clearly-defined public policy goals that cannot be achieved through payments innovations that leverage existing digital dollars. As of today, those use cases have not emerged.

If a viable use case for CBDC in the United States does emerge in the future, design choices must be carefully considered to ensure that the benefits as well as the risks of introducing a CBDC are fully appreciated.